



## **PROPOSED**

**Cleaner Burning Gasoline  
State Implementation Plan Revision:  
Removal of February and March from the Winter  
Gasoline Season**

*Air Quality Division  
July 2007*

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## **1.0 Purpose of SIP Revision**

The purpose of this submittal is to reduce the length of the wintertime fuel season and to petition the Administrator of the Environmental Protection Agency (EPA) to reduce the period required for oxygenated gasoline in the Phoenix carbon monoxide (CO) maintenance area as allowed under the Clean Air Act § 211(m)(2). This document contains a proposal to revise the State of Arizona's Cleaner Burning Gasoline (CBG) State Implementation Plan (SIP) by reducing the winter fuel season from 5 months to 3 months, eliminating the oxygenate requirement allowing the sale and use of Type 1 CBG and relaxing the Reid vapor pressure standard during the months of February and March. The analysis contained herein demonstrates that there will be no exceedances of the carbon monoxide standard during those two months, nor will there be a risk of backsliding on commitments related to CO attainment. We will also show a de minimis impact on particulate matter emissions associated with on-road vehicle exhaust.

The wintertime CBG program currently requires Arizona CBG to meet a specific vapor pressure, oxygenate content and other fuel property limits from November 2 through March 31 of each year. This SIP revision proposes to eliminate the months of February and March from the wintertime CBG requirements. General CBG requirements will apply to the months of February and March.

This SIP revision also includes the petition to reduce the period for oxygenated gasoline. The petition can be found in Section 7.0.

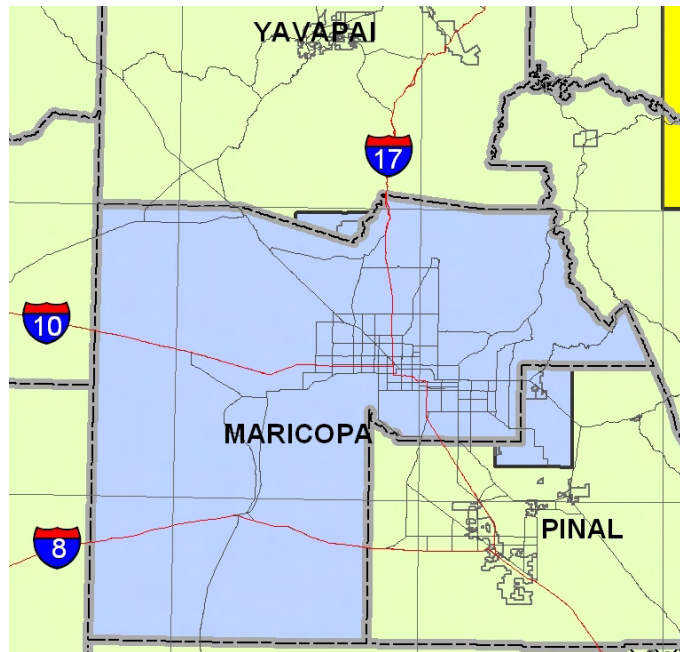
## **2.0 Regulatory Background**

### **2.1 Arizona CBG Program**

The greater Phoenix metropolitan area is currently designated nonattainment for particulate matter less than 10 microns in diameter (PM<sub>10</sub>) and 8-hour ozone. The area is designated as attainment for 1-hour ozone and on April 8, 2005, was redesignated as attainment for CO.

Clean Air Act § 211 regulates fuels and establishes fuel requirements for reformulated gasoline in ozone nonattainment areas and oxygenated fuels in CO nonattainment areas. On January 23, 1998, EPA approved a SIP revision submitted by the State of Arizona establishing Cleaner Burning Gasoline fuel requirements for gasoline distributed in the Phoenix (Maricopa County) ozone nonattainment area. The CBG program is applicable in the geographic area defined as the "CBG-covered area" under Arizona Administrative Code (A.A.C.) Title 20, Chapter 2, Article 701 (R20-2-701) and includes Maricopa County and portions of Pinal and Yavapai counties defined as Area A in Arizona Revised Statutes (A.R.S.) § 49-541. Figure 2-1 shows the boundaries of the CBG-covered area.

**Figure 2-1  
CBG-Covered Area**



In 1993, the Arizona State Legislature passed House Bill 2001 (HB2001) which established maximum vapor pressure standards for gasoline supplied or sold in Area A. The maximum vapor pressure from was set at nine pounds per square inch (psi) from September 30 through March 31 and seven psi from May 31 through September 30 beginning in September 1994.

On May 27, 1998, Governor Jane Dee Hull approved legislation, HB 2347, that required all gasoline produced and shipped to Maricopa County and sold or offered for sale or use in motor vehicles in Area A to meet the California Air Resources Board Phase II reformulated gasoline (CARB2) standards with an ethanol content of 10% by volume from November 2 through March 31, beginning in 2000. Standards for motor fuels established by these and other bills are located in A.R.S. 41-2083, 41-2123 and 41-2124.

In September 1999, the Arizona Department of Weights and Measures (ADWM), in consultation with the Arizona Department of Environmental Quality (ADEQ), completed changes to the Arizona CBG rules contained in A.A.C. Title 20, Chapter 2, Article 7 (R20-2-701 through R20-2-760) to implement HB 2347. These rules establish the specific fuel property requirements for “winter” and “summer” fuels and the dates that these fuels must be in use.

In 2000, Arizona submitted a SIP revision for the Maricopa County CO nonattainment area that included wintertime CBG requirements. The CBG fuel requirements were developed to reduce emissions of volatile organic compounds (VOC), oxides of nitrogen (NO<sub>x</sub>), CO and PM<sub>10</sub>. The requirements were necessary for the Phoenix area to attain the national ambient air quality standards (NAAQS) and to comply with the Clean Air Act § 211(k) and (m).

The Clean Air Act § 211(m)(6) requires that the oxygenated fuels program remain in effect in areas that have been redesignated as attainment for CO for as long as necessary to maintain the NAAQS standard. Therefore, even though the Phoenix area was redesignated attainment for CO, Arizona is continuing with its wintertime CBG program for those months where violations of the CO NAAQS could occur (November through January) and is proposing to eliminate those months where the standard has consistently been met (February and March).

## **2.2 House Bill 2207**

On June 1, 2004, Governor Janet Napolitano signed House Bill 2207 (HB 2207) into law. This bill amends A.R.S. 41-2124 changing the current season length in which CBG meeting CARB 2 standards is used, subject to federal approval. HB 2207 also required ADEQ in consultation with ADWM to:

- Collect and analyze data on the removal of the months of February and March from the winter CBG season to determine if the oxygenate requirements under CAA § 211(m)(2) and the Reid vapor pressure standards are not needed to meet the CO NAAQS.
- Cooperate with other parties in revising the EPA models to better reflect the impact of gasoline vapor pressure and oxygen content requirements on CO emissions.
- Complete data collection and submit a CO SIP revision for Area A addressing the removal of February and March from wintertime CBG requirements.
- Determine emissions and supply impacts of CARB 3 gasoline use.

A copy of HB 2207 is included in Appendix A. The study to determine the effects of removing February and March from the CBG winter fuels program on CO impacts was completed by Sierra Research, Inc. The results of this study are discussed in Section 5.1 and a copy of the complete study is included in Appendix C.

## **2.3 Senate Bill 1275**

On April 18, 2005, Governor Janet Napolitano signed into law Senate Bill 1275 (SB 1275). A copy of the bill is included in Appendix B. SB 1275 amends A.R.S. 41-2083 and 41-2123 to incorporate the following changes:

- The period for meeting the maximum vapor pressure standard of 9.0 psi for gasoline supplied to Area A is changed from October 1 through March 31 to October 1 through January 31 of each year. The timeframe for the requirement that gasoline in Area A contain a minimum of 10% by volume of ethanol is changed from November 1 through March 31 to November 1 through January 31 of each year.
- These requirements will not go into effect until EPA approves a revision to the SIP.



### 3.0 Proposed Revision to the CBG Program

The proposed SIP revision will shorten the wintertime period during which CARB2 gasoline standards, the Reid vapor pressure (RVP) standard, and the oxygenate limits are required. The current CBG winter season is from November 2 through March 31 and the proposal would shorten the season to November 1 through January 31. The regulatory justification and emissions impacts for shortening the season are included in Sections 4.0 and 5.0 respectively. If the shortened season is approved, the general Arizona CBG requirements for service station and fleet owners as listed in R20-2-751(A) will be in effect during the months of February and March. Current and proposed maximum caps for CBG (enforced at points beyond the refinery) are shown in Table 3-1. The tables for fuel performance standards as contained in R20-2-701 through R20-2-760 are included in Appendix E.

**Table 3-1**  
**Current vs. Proposed CBG Requirements**

CBG Requirement (for service station and fleet owners)	Current Winter CBG	Proposed Feb. & Mar. CBG
Duration	Nov. 2-March 31	Feb. and Mar.
Vapor Pressure	9.0 psi	ASTM
Oxygen Content	10 % vol ethanol 4.0 % (wt)	0 % wt
Sulfur (max.)	80 ppm (wt)	80 ppm (wt)
Aromatics	30 % (vol)	50 % (vol)
Olefins	10 % (vol)	25 % (vol)
E200	NA	70-30 %
E300	NA	100-70 %
90% dist. temp. (T90)	330°F	NA
50% dist. temp. (T50)	220°F	NA

### 4.0 Justification for Shortened Wintertime CBG Program

The SIP revision to shorten the length of the wintertime CBG program from 5 months to 3 months is justified for the following reasons:

- Ambient CO monitoring data show that CO concentrations have remained consistently below the CO NAAQS and no violations have occurred during the months of February and March for over 15 years. Modeling impacts predict that maximum ambient CO concentration in Area A would be less than 5.8 ppm with a shortened wintertime CBG program (see Section 5.1).
- EPA redesignated Area A as attainment for CO on April 8, 2005. Section 211(m)(6) states that CO areas that have been redesignated as attainment must continue the use of oxygenated fuels to the extent that the program is necessary

to meet the CO NAAQS. ADEQ has demonstrated that the oxygenated fuels program is no longer necessary to meet the CO NAAQS for the months of February and March (see Section 5.1).

- Section 211(m)(2)(B) of the Clean Air Act requires an oxygenated fuels program in CO nonattainment areas for four months of the year unless the state can demonstrate that there will be no exceedances of the CO NAAQS during the reduced period. ADEQ has demonstrated that there will be no violations of the CO NAAQS by eliminating the months of February and March from its CBG program and is petitioning the EPA to reduce the length of the winter CBG season (see Section 7.0).
- Section 110(l) of the Clean Air Act states that EPA may not approve a SIP revision if the revision would interfere with any applicable requirement concerning attainment or reasonable further progress. ADEQ has demonstrated that the removal of February and March from the wintertime CBG program will not interfere with attainment of the CO NAAQS, any other NAAQS or any other applicable requirement of the Clean Air Act (see Sections 5.2-5.6 and 6.0).
- ADEQ is including a Contingency Measure as part of this SIP revision. In the event of a violation of the CO NAAQS during either the month of February or March, ADEQ will initiate the process to reinstate the requirements of the wintertime CBG program for the months of February and March effective in the winter season following the violation (see Section 6.2.3).
- The seasonal standards for the wintertime fuel can create logistical problems that may restrict the supply of gasoline during February and March within the Phoenix metropolitan area. The transition from wintertime to summertime blends currently occurs during one month (April). The lengthening of the transition period is expected to mitigate this problem.

## **5.0 Emissions Impact Analysis**

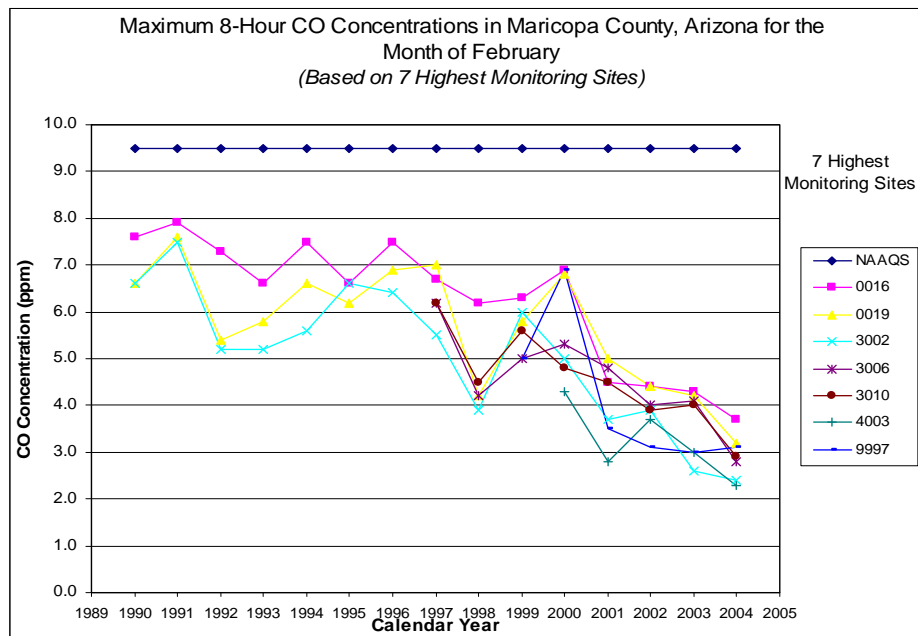
This section addresses the impacts of the shortened wintertime CBG program on emissions and ambient concentrations of regulated pollutants. The purpose of the wintertime CBG program is primarily to reduce emissions of CO from vehicle exhaust. Maricopa County, which includes Area A, is also designated nonattainment for eight-hour ozone and PM<sub>10</sub>. The impacts of the shortened wintertime CBG program on these pollutants, as well as other pollutants affected by CBG, are also discussed below.

### **5.1 Carbon Monoxide**

The implementation of more stringent emission standards on new vehicles, operation of an aggressive vehicle inspection and maintenance program, and implementation of the Arizona CBG program has resulted in a dramatic decline in ambient levels of CO in the Phoenix metropolitan area since 1990. In the last 15 years, the highest CO levels measured in the Phoenix metropolitan area have occurred during the months of November, December and January. During that time period no violations of the CO NAAQS were recorded during the months of February and March. In fact, since 2001 the maximum 8-

hour CO concentrations for these months were at least 45 % below the standard and since 2004, have been 60 % below the standard. Figure 5-1 and Figure 5-2 show the maximum 8-hour CO concentrations recorded at monitoring stations in Maricopa County for February and March, respectively. These figures show that there has been a continuing significant downward trend in CO concentrations since 1989. Note that the data displayed in the two figures are actually based on the highest concentrations, while compliance with the NAAQS is based on the second highest concentration.

**Figure 5-1**  
**Maximum February 8-Hour CO Concentrations**



**Figure 5-2**  
**Maximum March 8-Hour CO Concentrations**

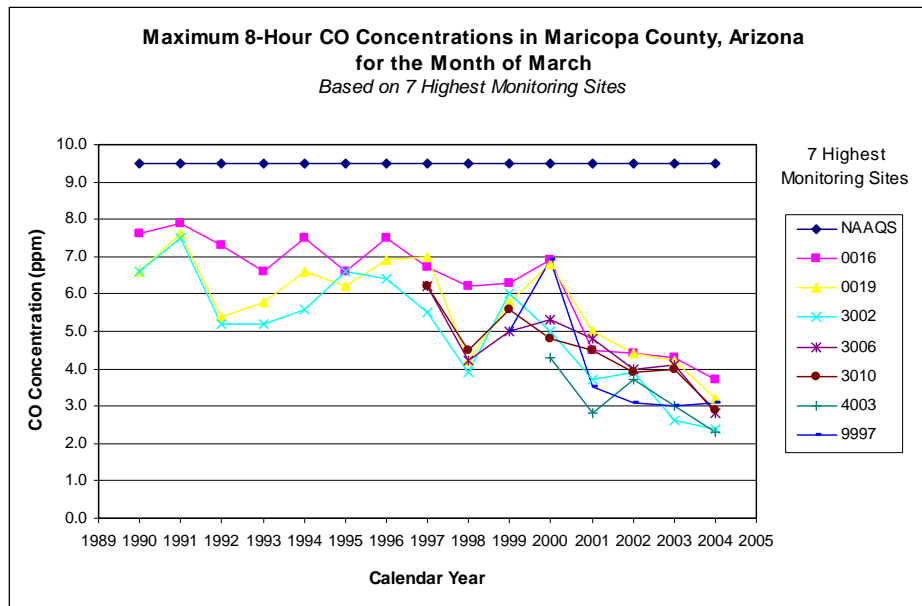
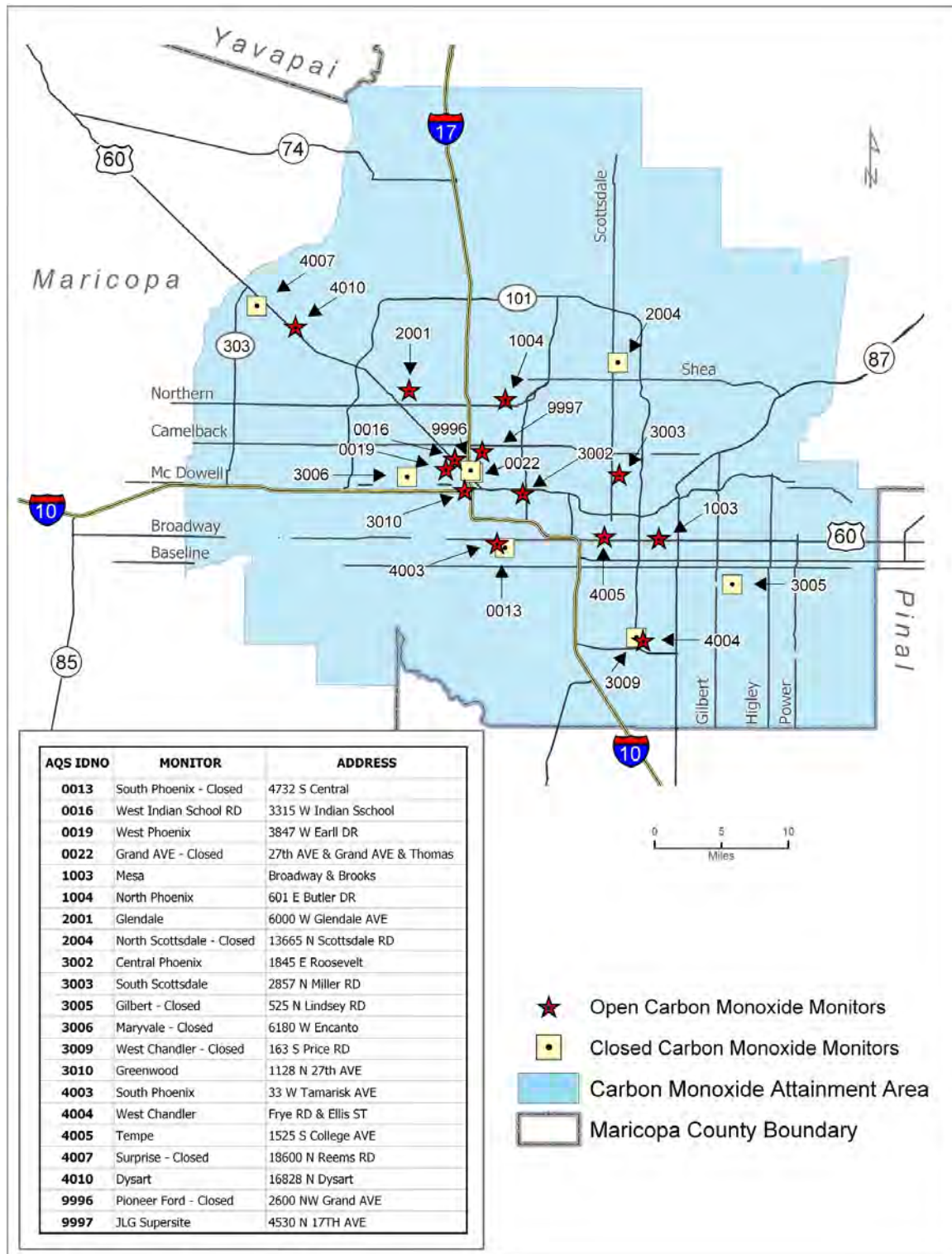


Figure 5-3 is a map of the location of these monitors.

**Figure 5-3  
CO Monitor Locations**



ADEQ retained Sierra Research, Inc. to determine the emissions and air quality impacts of modifying the current wintertime CBG standards in Area A for the months of February and March. Sierra Research, Inc. submitted the results of their analysis in a report titled *Impacts of Eliminating Maricopa County Wintertime Gasoline Standards on Emissions and Ambient Concentrations of CO in February and March*, January 24, 2005. A copy of the report is included in Appendix C. The report included an evaluation of ambient CO concentrations in the Phoenix metropolitan area from 1990 through March 2004. It also included an assessment of the emissions impacts of the proposed CBG program using EPA's MOBILE6.2 emission factors model, and a "roll forward" assessment of estimated CO concentrations for February and March 2005, 2010 and 2015 with the proposed CBG program.

The latest MOBILE6 inputs developed by the Maricopa Association of Governments (MAG) for the *May 2003 Carbon Monoxide Redesignation Request and Maintenance Plan* (MAG 2003 Plan) were used in the modeling analysis. Changes to ambient temperature were made to reflect February and March conditions, and the fuel specification changes were modeled as follows:

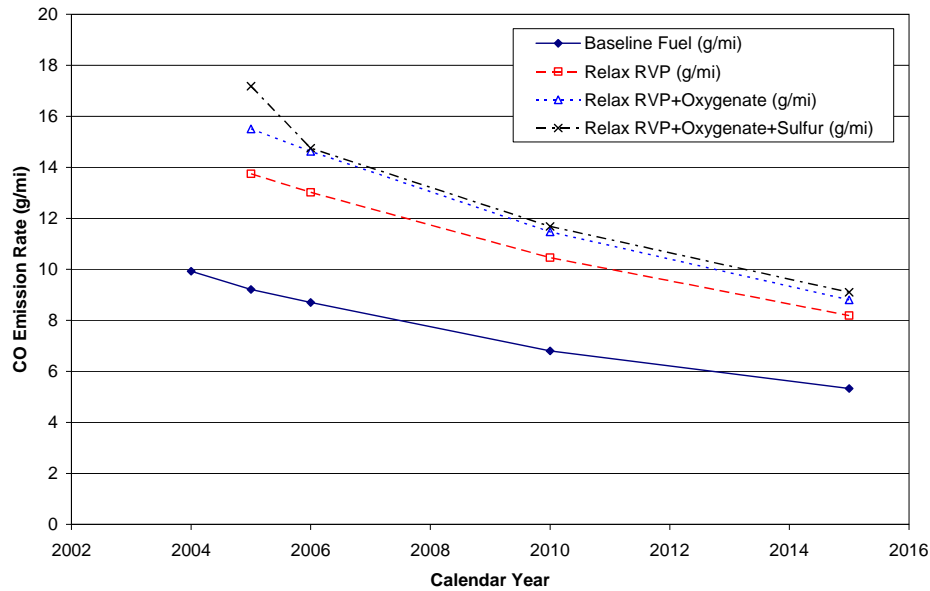
- Relaxed RVP to ASTM standards for February (13.5 psi) and March (11.5 psi);
- Removal of oxygenate requirements; and
- Relaxation of sulfur levels to federal Tier 2 requirements.

The impacts of these changes on CO emission rates calculated with MOBILE6 for the month of March are illustrated in Figure 5-4. This figure shows the estimated emissions from all vehicle types and shows the incremental impacts of the four fuel specification scenarios that were analyzed. The March results are presented here, as the impacts of the fuel changes were more pronounced for March than for February. The results of the "Relax RVP+Oxygenate+Sulfur" scenario represent the proposed CBG requirements for February and March. It should be noted that the basis of these impacts in MOBILE6 is quite dated, and likely overstates the RVP effect on late-model vehicles.<sup>1</sup> Thus, these estimates reflect a worst-case scenario.

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<sup>1</sup>The MOBILE6 RVP corrections are based on testing of mid-1980s and older vehicles, which showed that CO emissions increased as the fuel volatility increased. This effect is primarily a result of increased hydrocarbon vapors stored in the evaporative canister, which are then "purged" with fresh air and burned in the engine. On older vehicles, this created a rich mixture that resulted in an increase in CO emissions. However, significant improvements have been made in vehicle purge strategies over the past 10 years, and the test data upon which the MOBILE6 corrections are based do not include vehicles with this technology.

**Figure 5-4**  
**Maricopa County MOBILE6.2 CO Emission Factors Calculated for March**



Using the emission factors obtained from the MOBILE6 analysis, in conjunction with estimates of vehicle miles traveled (VMT); motor vehicle CO emissions inventories were developed for 2004, 2005, 2010, and 2015 for February and March. CO emissions estimates for other source categories (i.e., point, area, and non-road sources) were obtained from the MAG 2003 Plan. The emission inventory estimates, along with 2004 ambient concentration data, were used in a “roll-forward” analysis to predict how changes to fuel specifications would impact 8-hour maximum CO concentrations observed in February and March. The results of this evaluation, which can be considered a “regional” analysis, are summarized in Table 5-1. The table shows that although CO concentrations are predicted to increase by up to 70%, the maximum estimated value (5.7 ppm) is well below the 8-hour standard of 9 ppm. While most of the predicted increase is due to the change in fuel requirements, it is important to note that the model underestimates the effectiveness of combustion technology on newer model vehicles and the predicted maximum value is overestimated.

**Table 5-1**  
**Estimated Maximum 8-Hour CO Concentrations**  
**Based on a Roll-Forward Analysis with All Emissions Sources**  
**(Regional Scale)**

Month	Fuel Scenario	Estimated Concentration by Calendar Year (ppm)			
		2004	2005	2010	2015
February	Baseline	3.7	3.6	3.3	3.1
	Relaxed		5.4	4.5	4.2
March	Baseline	3.5	3.4	3.0	2.8
	Relaxed		5.7	4.7	4.3

## 5.2 Nitrogen Dioxide

Changes in NO<sub>x</sub>, as well as VOC and HAPs, were estimated using EPA's Complex Emissions Model prescribed in 40 CFR 80.45. The model results are shown in Table 5-2. The winter fuel and February/March fuel parameters are based on actual refining analyses for fuel delivered to the Phoenix area.

As indicated in Table 5-2, using the target fuel rather than CBG will produce a 3.11 % increase in emissions of NO<sub>x</sub>. Since the increase will be limited to a two month period, the annual increase is  $3.11 \% \times 2/12 = 0.52 \%$ . Annual nitrogen dioxide concentrations (NO<sub>2</sub>) in Maricopa County range from less than 10 percent to 70 percent of the NAAQS (see Appendix F, Table 1), providing a compliance margin of 30 %. Thus, even we assume that 100 % of the additional NO<sub>x</sub> emitted will react to form NO<sub>2</sub>, the change to the target fuel will not result in a violation of the NO<sub>2</sub> NAAQS.



**Table 5-2**  
**Estimated Change in Motor Vehicle Emissions**  
**Using EPA's COMPLEX Emissions Model**

<b>Model Input Parameters</b>			
Fuel Property	Current Winter Fuel*	Target Fuel**	
Ethanol (wt % oxygen)	3.5	0	
SULFUR (ppm)	20	30	
RVP (psi)	8.7	8.7	
E200 (%)	58.4	52.5	
E300 (%)	89.4	88.2	
AROMATICS (vol %)	20.5	25.7	
OLEFINS (vol %)	2.3	9.2	
BENZENE (vol %)	0.97	0.96	
<b>Estimated Emissions</b>			
	Emissions from Current Fuel (mg/mi)	Emissions from Target Fuel (mg/mi)	Percent Change (%)
NO <sub>x</sub>	1302.30	1342.79	3.11
Total VOC	1218.46	1242.89	2.00
Exhaust Benzene	44.18	58.99	33.52
Nonexhaust Benzene	0.00	0.00	0.00
Acetaldehyde	15.25	6.30	-58.69
Formaldehyde	17.92	15.34	-14.39
Butadiene	8.75	13.05	49.15
POM	4.09	4.17	2.00
Total Exhaust Toxics	90.19	97.85	8.50
Total Toxics	90.19	97.85	8.50

\*Winter fuel is based on "Baseline Fuel" from Cost, Supply, and Emissions Impacts of Adopting the California Phase 3 Gasoline Standard for Arizona's Cleaner Burning Gasoline Program, Mathpro Inc. and Meszler Engineering Services, December 1, 2005

\*\*Feb./Mar.fuel is based on CBG Type 1 from Evaluation of Gasoline and Diesel Fuel Options for Maricopa County, Mathpro Inc., February 16, 1998.

In addition, new federal requirements for reduced sulfur content in gasoline will result in reductions of NO<sub>x</sub> emissions and may compensate for the predicted increase in NO<sub>x</sub> emissions.

### 5.3 PM<sub>10</sub>

According to the Maricopa Association of Government's 1999 Revised PM<sub>10</sub> SIP for Maricopa County (1999 SIP), page 3-3, by far the most significant cause of PM<sub>10</sub> nonattainment is fugitive dust from sources such as windblown dust, agricultural operations, traffic on paved and unpaved roads, construction and earth moving. Together, these sources contributed 87.5 % of the 1995 PM<sub>10</sub> inventory for the county. The January 2007 Public Review Draft of the 2005 Periodic PM<sub>10</sub> Emissions Inventory prepared by the Maricopa County Air Quality Department (2005 Inventory) confirms that these sources, together with wildfires, are the primary contributors. (Relevant pages from the 2005 Inventory are included in Appendix G.)

For this reason the 1999 SIP and Salt River SIP have concentrated on control measures for fugitive dust sources. Given the failure to attain the PM<sub>10</sub> NAAQS by the December 31, 2006, deadline, measures for other sources, as well as more effective controls for fugitive dust sources, may be necessary. As the following discussion demonstrates, however, reducing PM<sub>10</sub> emissions from gasoline exhaust does not have the potential to contribute to the solution of Maricopa County's ongoing PM<sub>10</sub> nonattainment problem. In fact, although the 1999 SIP included CBG as a control measure, its attainment demonstration (Table 8-3 at page 8-15) assumed no reduction in PM<sub>10</sub> emissions from CBG.

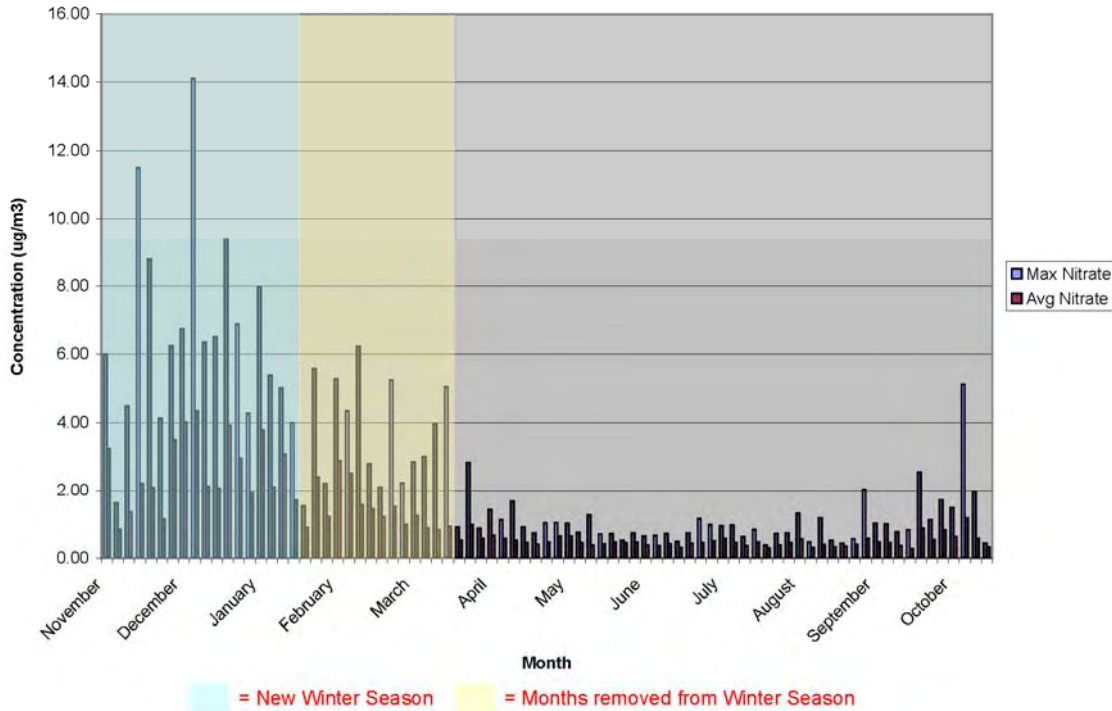
#### 5.3.1 Primary and Secondary PM<sub>10</sub> Emissions from Gasoline Exhaust

Gasoline combustion in motor vehicles produces both primary and secondary PM<sub>10</sub>. The contribution of gasoline combustion to secondary PM<sub>10</sub> results primarily from the conversion of NO<sub>x</sub> emissions to particulate nitrate, which occurs through a series of complex chemical reactions. These reactions are dependent on many atmospheric factors including temperature and relative humidity. As confirmed by ambient monitoring data (see Figure 5-5), higher temperatures and lower humidity in February and March (as compared to October through January) result in less formation of nitrate during these months. In addition, dry deposition accounts for a significant portion of the conversion of emitted NO<sub>x</sub>. Studies have shown that typically less than 10% of gaseous NO<sub>x</sub> emissions are converted to particulate nitrate.<sup>2</sup>

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<sup>2</sup> A.G. Russell, G.J. McRae, and G.R. Cass (1985), "The Dynamics of Nitric Acid Production and the Fate of Nitrogen Oxides", *Atmospheric Environment*, Vol 19, No. 6, pp 893-903; L.M. Hildemann, A.G. Russell, and G.R. Cass (1984), "Ammonia and Nitric Acid Concentrations in Equilibrium with Atmospheric Aerosols: Experiment vs Theory", *Atmospheric Environment*, Vol 18, No. 9, pp 1737-1750.

**Figure 5-5**  
**Nitrate Concentrations by Month 2000-2006<sup>3</sup>**



As demonstrated in the following subsections, the combined effect of discontinuing the use of the wintertime CBG formulation during February and March on primary and secondary  $\text{PM}_{10}$  emissions in Maricopa County will be negligible, particularly when seasonal variations in nitrate concentrations are taken into account. The change in the winter season therefore will not interfere with attainment of the  $\text{PM}_{10}$  NAAQS.

### 5.3.2 Primary $\text{PM}_{10}$ Impact

According to the 1999 SIP, page 8-9, the anticipated reduction in primary  $\text{PM}_{10}$  emissions from the use of CBG was, and the increase from discontinuing its use therefore will be, 0.03 metric tons per day (MTD).

Taking into account that CBG use will only be discontinued for two months of the year, the total annual impact will be:

$$0.03 \text{ MTD} * 365 \text{ d/yr} * 1.102 \text{ metric tons/ton} * 2/12 = 2.01 \text{ tons per year (TPY)}.$$

<sup>3</sup> The raw data for this figure can be found in Appendix F, Table 2.

### 5.3.3 Secondary PM<sub>10</sub> Impact

As indicated in Table 5-3, derived from page 111 of the 2005 Inventory, daily emissions of NO<sub>x</sub> from gasoline exhaust in Maricopa County are 78.3 MTD. As noted in section 5.2 above, CBG produces a 3.11 % reduction in NO<sub>x</sub> emissions. The reduction in NO<sub>x</sub> from using CBG, and the increase from discontinuing its use, is therefore  $78.3 \text{ MTD} * 0.0311 = 2.4 \text{ MTD}$ .

**Table 5-3**  
**Daily PM<sub>10</sub> Emissions From Gasoline Vehicle Exhaust**

Vehicle Type	NO <sub>x</sub> Emissions (MTD)
LDGV	26.004
LDGT1	4.909
LDGT2	21.622
LDGT3	8.282
LDGT4	5.403
HDGV2B	9.687
HDGV3	0.365
HDGV4	0.157
HDGV5	0.478
HDGV6	0.984
HDGV7	0.442
HDGV8A	0.000
HDGV8B	0.000
<b>Total</b>	<b>78.333</b>

Since less than 10 % of NO<sub>x</sub> emitted forms nitrate, the maximum increase in nitrate from discontinuing the use of CBG is  $2.4 \text{ MTD} * 0.1 = 0.24 \text{ MTD}$ .

On an annual basis this amounts to:

$0.24 \text{ MTD} * 365 \text{ d/yr} * 1.102 \text{ metric tons/ton} * 2/12 = 16.09 \text{ TPY}$ .

### 5.3.4 Total Impact

The total maximum increases in PM<sub>10</sub> emissions from reducing the winter CBG season are summarized in Table 5-4.

**Table 5-4**  
**Total PM<sub>10</sub> Increase from Change in Winter Season**

	Primary	Secondary	Total
Daily (Metric Tons)	0.03	0.24	0.27
Annual (Tons)	2.01	16.09	18.10

As indicated in Table 5-5 and Table 5-6, which are derived from the 2005 Inventory, total emissions of PM<sub>10</sub> are 704 MTD and 235,058 TPY, respectively.

**Table 5-5**  
**Total Daily PM<sub>10</sub> Emissions in Maricopa County**

	PM <sub>10</sub>	NO <sub>x</sub>
lbs/day	1,472,367	787,192
MTD	668	357
Secondary from NO <sub>x</sub> (MTD) *	36	-
Total (MTD)	704	-

\*Ten percent of NO<sub>x</sub>

**Table 5-6**  
**Total Annual PM<sub>10</sub> Emissions in Maricopa County**

	PM <sub>10</sub>	NO <sub>x</sub>
Primary (TPY)	221,801	132,564
Secondary (TPY) *	13,256	-
Total (TPY)	235,058	-

\*Ten percent of NO<sub>x</sub>

The percentage increase in total PM<sub>10</sub> emissions from the reduction in the winter CBG season will be negligible:

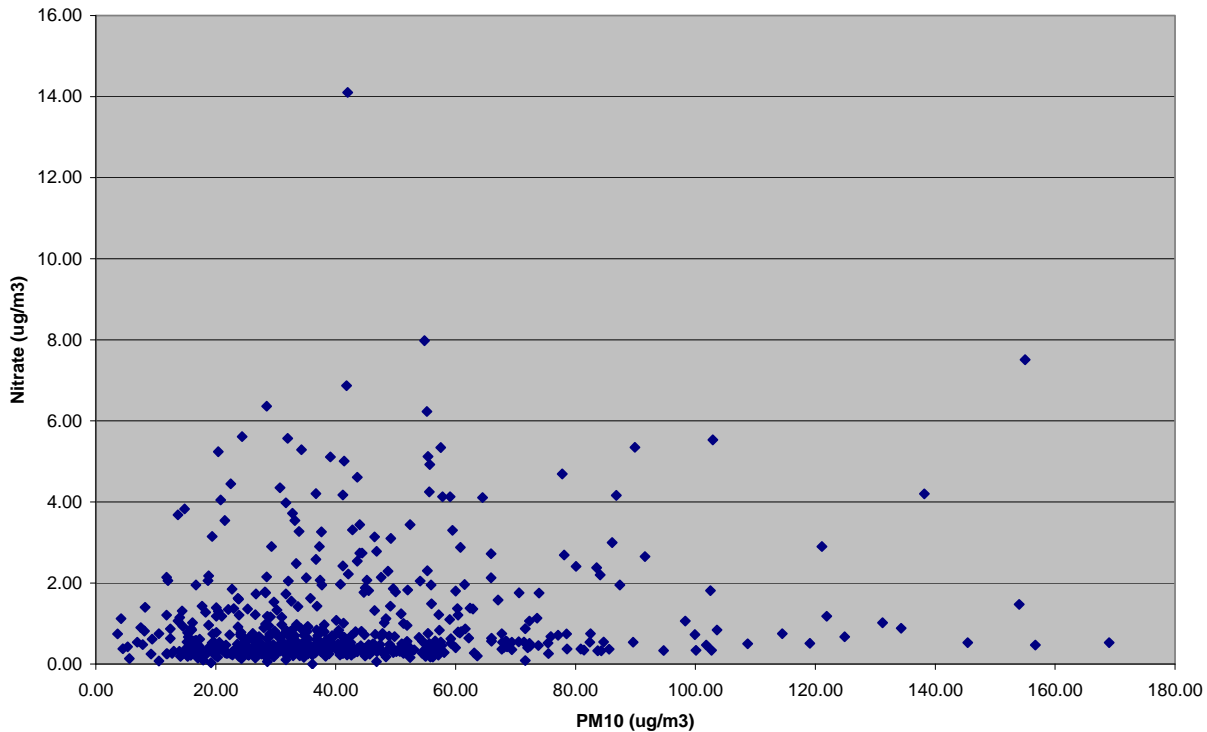
24-Hour:            0.27 MTD/704 MTD            =            **0.04 %**

Annual:            18.10 TPY/235,058 TPY            =            **0.008 %**

### **5.3.5 Seasonal Variations in PM<sub>10</sub> and Nitrate Concentrations**

High concentrations of PM<sub>10</sub> occur during all periods of the year, including February and March. It is therefore not possible to show that the reduction in the winter CBG season will have no impact on PM<sub>10</sub> during periods of nonattainment with the 24-hour NAAQS. However, as discussed above, the primary means by which gasoline combustion contributes to PM<sub>10</sub> concentrations is through the reaction of NO<sub>x</sub> to form nitrate. As already noted, nitrate concentrations tend to be lower in February and March than during the remainder of the current winter CBG season. In addition, as indicated in Figure 5-6, nitrate and PM<sub>10</sub> concentrations are not correlated.

**Figure 5-6**  
**Correlation Between 24-Hour PM<sub>10</sub> and Nitrate Measured at the Same Monitor**  
**in Maricopa County from 2000 to 2006<sup>4</sup>**



These facts, combined with the negligible impact of CBG on nitrate concentrations, support a determination that reduction of the winter CBG season will not interfere with attainment of the PM<sub>10</sub> NAAQS.

#### 5.4 PM<sub>2.5</sub>

Maricopa County is classified as unclassifiable/attainment area for PM<sub>2.5</sub>. 40 C.F.R. § 81.303. The negligible increases in PM<sub>2.5</sub> emissions that may result from reducing the winter CBG season will be well within the area's margin for compliance and therefore will not interfere with continued attainment of the PM<sub>2.5</sub> NAAQS. This conclusion is further supported by the seasonal variation in PM<sub>2.5</sub> concentrations.

As indicated in Appendix F, Table 4, the maximum three-year average of the 98<sup>th</sup> percentile 24-hour average PM<sub>2.5</sub> value recorded at any monitor in Maricopa County for 2000 to 2006 was 34.8 µg/m<sup>3</sup>. The margin for compliance with the 24-hour standard of 35.5 µg/m<sup>3</sup> is therefore  $1 - 34.8/35.5 = 2\%$ . The maximum annual concentration for the same period was 13.9 µg/m<sup>3</sup>, providing a margin of compliance with the 15.5 µg/m<sup>3</sup> annual standard of  $1 - 13.9/15.5 = 10.3\%$ .

<sup>4</sup> The raw data for this figure can be found in Appendix F, Table 3. The correlation factor for the data is 0.16.

As indicated in Table 5-7 and Table 5-8, derived from the 2005 inventory, 24-hour and annual PM<sub>2.5</sub> emissions are 397 MTD and 132,879 TPY, respectively.

**Table 5-7  
Total Daily PM<sub>2.5</sub> Emissions in Maricopa County**

	PM <sub>2.5</sub>	NO <sub>x</sub>
lbs/day	796,613	787,192
MTD	361	357
Secondary from NO <sub>x</sub> (MTD)*	36	-
Total (MTD)	397	-

\*Ten percent of NO<sub>x</sub>

**Table 5-8  
Total Annual PM<sub>2.5</sub> Emissions in Maricopa County**

	PM <sub>2.5</sub>	NO <sub>x</sub>
Primary (TPY)	119,623	132,564
Secondary (TPY)*	13,256	-
Total (TPY)	132,879	-

\*Ten percent of NO<sub>x</sub>

If we conservatively assume that PM<sub>10</sub> emissions from gasoline vehicle exhaust consist entirely of PM<sub>2.5</sub>, then the percentage increase in PM<sub>2.5</sub> emissions resulting from the reduction in the winterCBG season is as follows:

$$\text{24-Hour:} \quad 0.27 \text{ MTD} / 397 \text{ MTD} = 0.07 \%$$

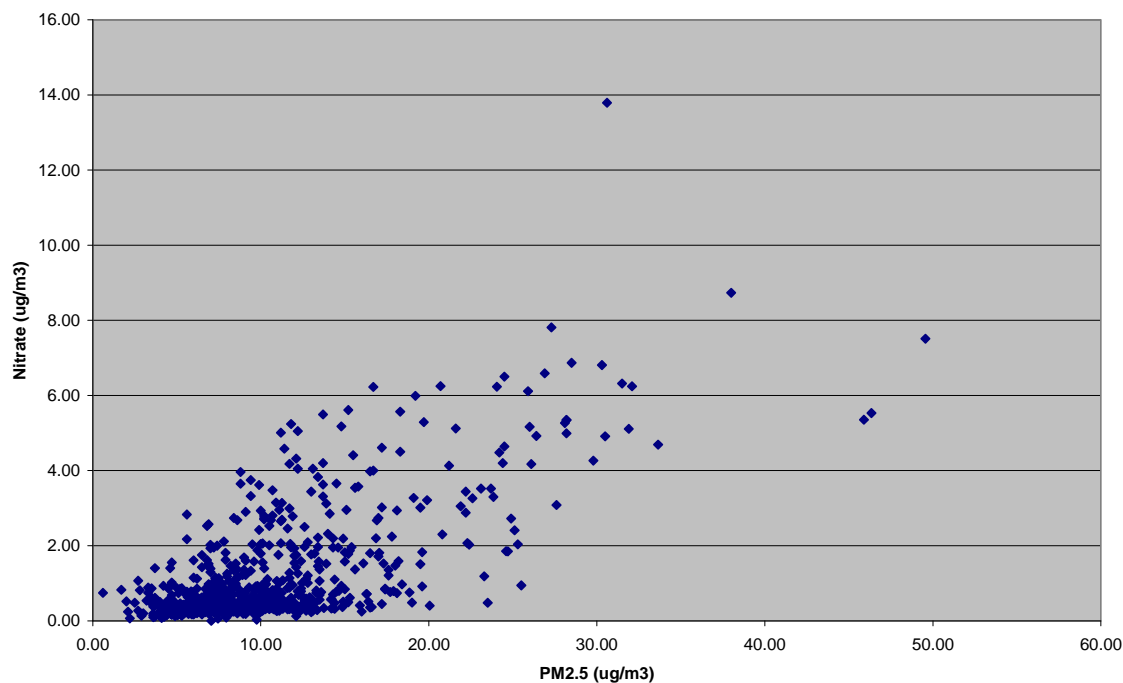
$$\text{Annual:} \quad 18.10 \text{ TPY} / 132,879 \text{ TPY} = 0.01 \%$$

Both values are well within the margin of compliance.

In addition, as Figure 5-7 and Figure 5-8 indicate, PM<sub>2.5</sub> concentrations are correlated with concentrations of nitrate and therefore vary seasonally.



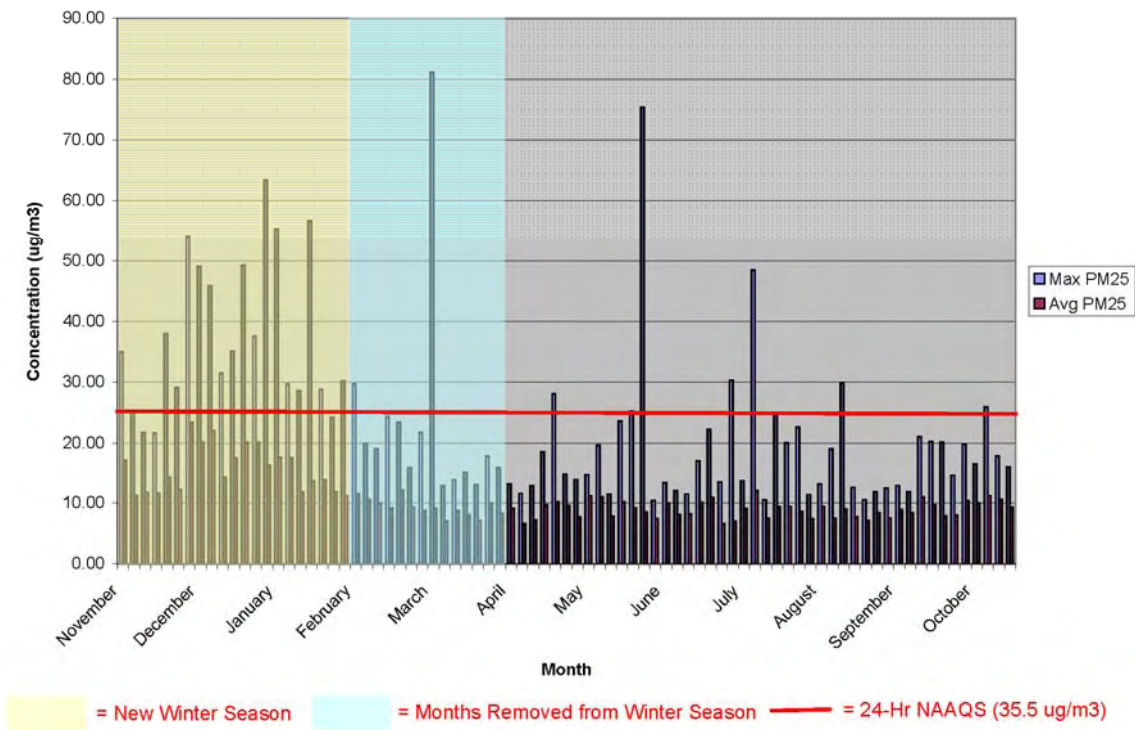
**Figure 5-7**  
**Correlation Between 24-Hour PM<sub>2.5</sub> and Nitrate Measured at the Same Monitor<sup>5</sup>**



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<sup>5</sup> The raw data for this figure can be found in Appendix F, Table 5. The correlation factor for this data is 0.69.

**Figure 5-8**  
**PM<sub>2.5</sub> Concentrations by Month 2000-2006<sup>6</sup>**



Except for an unusually high maximum 24-hour value of 81  $\mu\text{g}/\text{m}^3$  recorded on March 1, 2002, maximum and average PM<sub>2.5</sub> concentrations recorded in February and March tend to be substantially below the values recorded during the remainder of the current winter CBG season. The 81  $\mu\text{g}/\text{m}^3$  value, which was recorded at the West Phoenix site (AQS ID 0019) appears to be anomalous, since it is more than an order of magnitude greater than values recorded on the same day at two monitors within five miles of the site: the Supersite (AQS ID 9997) and West Virginia Avenue (AQS ID 9992).

The seasonal nature of PM<sub>2.5</sub> concentrations further reduces the risk that the negligible increase in PM<sub>2.5</sub> resulting from the proposed change in the winter CBG season will endanger the PM<sub>2.5</sub> NAAQS.

## 5.5 Ozone

Arizona CBG rules regarding the use of reformulated gasoline during the summer months are applicable requirements for purposes of meeting or making reasonable further progress toward attainment of the 1-hour and 8-hour ozone NAAQS. The summertime CBG program addresses the concerns with ozone formation, typically a summer pollutant, and is included as a strategy for controlling ozone emissions in the Ozone SIP. This CBG SIP

<sup>6</sup> The raw data for this figure can be found in Appendix F, Table 6.

revision concerns shortening the wintertime season (November through March), which is outside of the ozone season (May 1 through September 30). Ozone data from EPA's *TSD for Phoenix Ozone Attainment Finding, March 2001* shows that there were no exceedances of the ozone NAAQS during the months of November through March between 1980 and 1999 (the last year of ozone data analyzed). Gasoline sold in the Phoenix area during the months of February and March will still meet the general requirements of the Arizona CBG program. Eliminating the oxygenate requirement and relaxing the RVP during these two months could result in minor increases in VOC emissions; however, this is unlikely to result in the increased formation of ozone during these cooler months with limited sunlight and low temperatures. Removing the months of February and March from the wintertime CBG season will have no effect on achieving compliance with the ozone NAAQS.

Increases in ozone from the predicted slight increase in NO<sub>x</sub> emissions shown in Table 5-2 are also expected to be negligible during these cooler months.

## **5.6 Other Emissions Impacts**

Emissions of VOC and hazardous air pollutants (HAPs) will also be affected by changing the fuel requirements for the months of February and March. In general, concentrations of these pollutants improve during the months of February and March due to better atmospheric dispersion. The Phoenix area is affected by atmospheric temperature inversions during the winter months of October through January, which can contribute to higher concentrations of these pollutants. The CBG program will remain in place during these winter months.

Changes in VOC and HAPs were estimated using EPA's Complex Emissions Model prescribed in 40 CFR 80.45. The model results are shown in Table 5-2. The winter fuel and February/March fuel parameters are based on actual refining analyses for fuel delivered to the Phoenix area.

VOC emissions contain HAPs and can contribute to the formation of ozone and PM<sub>2.5</sub>. Emission impacts of HAPs are addressed in the next paragraph. The role of VOC emissions in PM<sub>2.5</sub> formation is poorly understood and modeling tools to address these emissions have not been developed. However, because the overall increase in VOC emissions is expected to be insignificant, formation of these secondary pollutants is expected to be negligible.

The Complex Model predicts emissions of five species of hazardous air pollutants. The model predicts significant increases in emissions of benzene and butadiene. However these increases are offset by substantial decreases in acetaldehyde and formaldehyde due primarily to the elimination of the oxygenate in the fuel. Emissions of hazardous air pollutants are typically evaluated in terms of their risk of cancer effects and non-cancer effects. Therefore, because the predicted HAPs emission increases are almost completely offset by the predicted HAPs emission decreases, the overall impacts from HAPs are expected to be negligible.

## **6.0 Clean Air Act § 110(l) Demonstration of Noninterference with Attainment**

Section 110(l) of the Clean Air Act (CAA) prohibits EPA from approving a State Implementation Plan (SIP) revision if the revision would interfere with any applicable requirement concerning attainment and reasonable further progress (RFP), or any other applicable requirement of the CAA.

Specifically, section 110(l) states:

Each revision to an implementation plan submitted by a State under this Act shall be adopted by such State after reasonable notice and public hearing. The Administrator shall not approve a revision of a plan if the revision would interfere with any applicable requirement concerning attainment and reasonable further progress (as defined in section 171), or any other applicable requirement of this Act.

### **6.1 Clean Air Act Requirements Not Affected by this SIP Revision**

Section 110(l) applies to all requirements of the CAA and to all areas of the country, whether attainment, nonattainment, unclassifiable or maintenance<sup>7</sup> for one or more of the six criteria pollutants: ozone, particulate matter (PM), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO) and lead (Pb). Section 110(l) is not limited in scope to those SIP revisions that only impact ambient air concentrations; therefore, this proposed revision to the CBG program is subject to complying with Section 110(l). SB 1275 and HB 2207, which precipitate the changes to the wintertime CBG program, do not affect or impact the following applicable requirements contained in other Arizona SIPs:

- Reasonably Available Control Technology (RACT) requirements
- Inspection and maintenance programs (I/M)
- Major source applicability cut-offs for purposes of RACT
- ROP (1-hour ozone)/RFP (8-hour ozone)
- Stage II vapor recovery
- Clean fuels fleet program under section 183(c)(4) of the CAA
- Clean fuels for boilers under section 183(e)(3) of the CAA
- Transportation Control Measures (TCMs) during heavy traffic hours as provided under section 182(e)(4) of the CAA
- Enhanced (ambient) monitoring under section 182(c)(1) of the CAA
- Transportation controls under section 182(c)(5) of the CAA
- Vehicle miles traveled provisions of section 182(d)(1) of the CAA

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<sup>7</sup>Section 110(l) applies to both maintenance plans under section 175A and those under section 110(a)(1) that may be required following promulgation of a new NAAQS.

- Nitrogen oxides (NO<sub>x</sub>) requirements under section 182(f) of the CAA
- 1-hour ozone attainment demonstrations
- Reasonably Available Control Measures (RACM)
- New Source Review
- Prevention of Significant Deterioration (PSD)
- Inter- and intrastate transport
- New Source Performance Standards
- Regional Haze under sections 169A and 169B of the CAA

## **6.2 Other Clean Air Act Requirements**

### **6.2.1 Removal of Control Measures**

No control measures are being removed by this SIP revision; therefore, a section 110(l) demonstration of noninterference for the removal of control measures is not applicable to this revision. Nor does this SIP revision involve the removal of any discretionary measures that have been or are still being implemented for the attainment of ozone, CO, VOC or PM<sub>10</sub>. This SIP revision is concerned with changing the length of the wintertime season in which CARB Phase 2 gasoline will be required.

### **6.2.2 NAAQS Impact of a Removal or Modification of a Measure**

Arizona's CBG program is a committed control measure for purposes of the CO SIP for wintertime fuels and the 1-Hour Ozone SIP for summertime fuels. This revision does not affect the CBG control measure specified in the 1-Hour Ozone SIP, but does modify the control measure for the CO SIP. As explained in section 5.0 above, any affect caused by implementation of this CO SIP revision will not cause the CO NAAQS or any other NAAQS to be violated.

### **6.2.3 Contingency Provisions**

The Clean Air Act § 175A(d) requires that revisions to SIPs for maintenance plans must contain contingency provisions to assure that any violation of a NAAQS will be promptly corrected (*Procedures for Processing Requests to Redesignate Areas to Attainment*, John Calcagni, Director, Air Quality Management Division, EPA, memorandum dated September 4, 1992). The contingency measure proposed for this CBG SIP revision is as follows:

Upon removal of February and March from the wintertime CBG program and in the event of a CO NAAQS violation during the months of February or March, ADEQ will immediately initiate a process with the Arizona State Legislature to reinstate the wintertime CBG requirements effective the February and March of the year following the violation. ADEQ will notify the Legislature by October following a violation, that during the General Session in January, ADEQ requests that the

Legislature draft new legislation to reinstate the wintertime CBG vapor pressure standard and oxygenate requirement for the months of February and March.

#### **6.2.4 Noninterference with Tribes**

Although the Gila River Indian Community (GRIC) was initially part of the CO and 1-Hour Ozone SIPs, GRIC has been removed by EPA actions found in 70 FR 11553, March 9, 2005 (corrected in 70 FR 52926, September 6, 2005) for the CO and in 70 FR 68339, November 10, 2005 for 1-Hour ozone. ADEQ maintains a cooperative relationship with GRIC and commits to working with the Tribe on any CAA § 110(l) issues affected by this SIP revision.

### **7.0 Petition to Reduce the Winter CBG Season under § 211(m)(2)(B) of the Clean Air Act**

The Clean Air Act § 211(m)(2)(B) provides the authority for states with CO nonattainment areas to petition the EPA to reduce the portion of the year that the state must have an oxygenated fuels program provided they can demonstrate that there will be no exceedances of the CO NAAQS. The Clean Air Act requires a four month period for the program and Arizona has operated a five month program since 2000. The Arizona State Legislature mandated under HB2207 that the ADEQ complete a SIP revision to remove February and March from the winter CBG program. ADEQ, with assistance from Sierra Research, Inc. has conducted an air quality analysis that demonstrates that the CO NAAQS will not be exceeded by removing the months of February and March from the winter CBG program. Therefore, the ADEQ petitions the EPA to use its authority under the Clean Air Act § 211(m)(2)(B) to reduce the portion of the year that the winter CBG program applies from November 2 through March 31 to November 1 through January 31 of each year.

### **8.0 Conclusion**

Arizona is proposing to modify its existing wintertime CBG program by removing the months of February and March from the winter CBG season. The unique characteristics of Arizona's winter boutique fuel and having only the month of April to transition into the summer fuel requirements has affected the price and availability of gasoline in the Phoenix area. A state may petition the EPA under the Clean Air Act § 211(m)(2)(B) to reduce the seasonal length of the oxygenated fuels program to less than four months if it can demonstrate that there will be no exceedances of the CO standard. ADEQ has shown through an air quality analysis that the CO NAAQS will be maintained in Area A during the months of February and March. In addition, ADEQ has met the requirements of Clean Air Act Section 110(l) by demonstrating that no other applicable requirements will be affected by this modification and has proposed a contingency measure in the unlikely event that a violation of the CO NAAQS were to occur during February or March.

# **Appendix A**

**Amendment to Arizona Laws; Arizona Laws 2004, Chapter 293,  
(House Bill 2207)**

PLEASE NOTE: In most BUT NOT ALL instances, the page and line numbering of bills on this web site correspond to the page and line numbering of the official printed version of the bills.

Senate Engrossed House Bill

State of Arizona  
House of Representatives  
Forty-sixth Legislature  
Second Regular Session  
2004

# HOUSE BILL 2207

AN ACT

AMENDING SECTION 41-2124, ARIZONA REVISED STATUTES; MAKING AN APPROPRIATION;  
RELATING TO MOTOR FUEL; PROVIDING FOR CONDITIONAL ENACTMENT.

(TEXT OF BILL BEGINS ON NEXT PAGE)



H.B. 2207

1 Be it enacted by the Legislature of the State of Arizona:

2 Section 1. Section 41-2124, Arizona Revised Statutes, is amended to  
3 read:

4 41-2124. Area A; fuel reformulation; rules

5 A. ~~From and after May 1, 1999~~ All gasoline produced and shipped to or  
6 within this state and sold or offered for sale for use in motor vehicles in a  
7 county with a population of one million two hundred thousand or more persons  
8 and any portion of a county contained in area A, subject to an appropriate  
9 waiver granted by the administrator of the United States environmental  
10 protection agency pursuant to section 211(c)(4) of the clean air act as  
11 defined in section 49-401.01, shall comply with either of the following fuel  
12 reformulation options:

13 1. A gasoline that meets standards for federal phase II reformulated  
14 gasoline, as provided in 40 Code of Federal Regulations section 80.41,  
15 paragraphs (e) through (h), in effect on January 1, 1999, except that the  
16 minimum oxygen content standard, including methyl tertiary butyl ether, does  
17 not apply. The gasoline shall also meet the maximum vapor pressure  
18 requirements in section 41-2083, subsections D and F.

19 2. California phase ~~2~~ 3 reformulated gasoline, including alternative  
20 formulations allowed by the predictive model, as adopted by the California  
21 air resources board pursuant to California code of regulations title 13,  
22 sections 2261 through ~~2262.7 and 2265~~ 2263, 2265 AND 2266.5, in effect on  
23 ~~January 1, 1997~~ MAY 1, 2003, ~~except that the minimum oxygen content standard,~~  
24 ~~including methyl tertiary butyl ether, does not apply. The gasoline shall~~  
25 ~~also meet the maximum~~ INCLUDING vapor pressure requirements ~~in section~~  
26 ~~41-2083, subsections D and F~~ CONTAINED IN SECTION 2262.4.

27 B. From and after November 1, 2000 through March 31, 2001 and from the  
28 period beginning November 1 through March 31 of each subsequent year, all  
29 gasoline produced and shipped to or within this state and sold or offered for  
30 sale for use in motor vehicles in a county with a population of one million  
31 two hundred thousand or more persons and any portion of a county contained in  
32 area A, subject to an appropriate waiver granted by the administrator of the  
33 United States environmental protection agency pursuant to section 211(c)(4)  
34 of the clean air act as defined in section 49-401.01, shall comply with  
35 standards for California phase ~~2~~ 3 reformulated gasoline, including  
36 alternative formulations allowed by the predictive model, as adopted by the  
37 California air resources board pursuant to California code of regulations  
38 title 13, sections 2261 through ~~2262.7 and 2265~~ 2263, 2265 AND 2266.5, in  
39 effect on ~~January 1, 1997~~ MAY 1, 2003 and shall meet the maximum vapor  
40 pressure requirements in section 41-2083, subsections D and F. The fuel  
41 described in this subsection shall meet the requirements of section 41-2123,  
42 subsection A, paragraph 1.

43 C. From November 1, 2000 through March 31, 2001 and for each winter  
44 season of November through March thereafter, the director of the department  
45 of weights and measures shall determine the average levels of the

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1 constituents in the gasoline sold or offered for sale in area A and shall  
2 provide the results of this determination to the director of THE DEPARTMENT  
3 OF environmental quality. The director of THE DEPARTMENT OF environmental  
4 quality shall analyze the data provided by the director of the department of  
5 weights and measures and, no later than July 1, 2001 and each July  
6 thereafter, shall determine the average daily carbon monoxide reductions  
7 resulting from the use of the gasoline specified in subsection B of this  
8 section during the preceding winter season. If the average daily carbon  
9 monoxide reductions resulting from the use of the gasoline specified in  
10 subsection B of this section during the preceding winter season are less than  
11 ninety per cent of the goal of thirty-two tons per day in 2001, thirty-one  
12 tons per day in 2003, thirty tons per day in 2005, twenty-nine tons per day  
13 in 2007, or twenty-eight tons per day in 2009, the director of the department  
14 of environmental quality shall immediately notify the governor, the president  
15 of the senate and the speaker of the house of representatives.

16 D. Any registered supplier or oxygenate blender, as defined in  
17 department rules, may petition the director to request that all registered  
18 suppliers or oxygenate blenders be allowed to comply with any provision of  
19 section 41-2123, subsection A, provided the petitioner can demonstrate that  
20 ethanol supply shortages are imminent.

21 E. The petition shall:

22 1. Identify specific supply conditions that will result in a shortage  
23 of ethanol.

24 2. Identify which oxygenate or oxygenates will be blended into  
25 gasoline for sale or use in area A.

26 3. Demonstrate that the alternative oxygenate blend comes closest to  
27 meeting a three and one-half per cent by weight oxygen content at reasonable  
28 cost.

29 4. Specify a time period for compliance with any provision of section  
30 41-2123, subsection A, not to exceed sixty days.

31 F. The director shall either grant or deny the petition in writing  
32 within seven days of its receipt. Any decision by the director to grant the  
33 petition shall be equally applicable to all registered suppliers or oxygenate  
34 blenders and shall not be selectively applied to any single registered  
35 supplier or oxygenate blender. The petition may be granted only if the  
36 director verifies that the basis for requesting the petition is factual.

37 G. The director may reauthorize a petition if the petitioner can  
38 demonstrate that the conditions have continued. The reauthorization of a  
39 petition shall not exceed thirty days.

40 H. The director of the department of weights and measures shall  
41 consult with the director of the department of environmental quality prior to  
42 granting, reauthorizing or denying any such petition.

43 ~~I. From and after November 1, 1999 through March 31, 2000, the fuels~~  
44 ~~described in subsection A of this section shall meet the requirements of~~  
45 ~~section 41-2123.~~

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1       ~~J.~~ I. The director of THE DEPARTMENT OF environmental quality in  
 2 consultation with the director of the department of weights and measures  
 3 shall adopt by rule:

4       1. Requirements to implement subsections A through E of this section.

5       2. Requirements for record keeping, reporting and analytical methods  
 6 for fuel providers to demonstrate compliance with subsections A through E of  
 7 this section.

8       J. THE DIRECTOR OF THE DEPARTMENT OF ENVIRONMENTAL QUALITY IN  
 9 CONSULTATION WITH THE DIRECTOR OF THE DEPARTMENT OF WEIGHTS AND MEASURES  
 10 SHALL ADOPT RULES TO IMPLEMENT THIS SECTION TO BE CONSISTENT WITH APPLICABLE  
 11 FEDERAL AND CALIFORNIA STATE FUEL FORMULATION RULES TO THE EXTENT  
 12 PRACTICABLE.

13       K. This section does not apply to fuel sold for use at a motor vehicle  
 14 manufacturer proving ground or at a motor vehicle racing event.

15       Sec. 2. Section 41-2124, Arizona Revised Statutes, is amended to read:

16       41-2124. Area A; fuel reformulation; rules

17       A. From and after May 1, 1999 all gasoline produced and shipped to or  
 18 within this state and sold or offered for sale for use in motor vehicles in a  
 19 county with a population of one million two hundred thousand or more persons  
 20 and any portion of a county contained in area A, subject to an appropriate  
 21 waiver granted by the administrator of the United States environmental  
 22 protection agency pursuant to section 211(c)(4) of the clean air act as  
 23 defined in section 49-401.01, shall comply with either of the following fuel  
 24 reformulation options:

25       1. A gasoline that meets standards for federal phase II reformulated  
 26 gasoline, as provided in 40 Code of Federal Regulations section 80.41,  
 27 paragraphs (e) through (h), in effect on January 1, 1999, except that the  
 28 minimum oxygen content standard, including methyl tertiary butyl ether, does  
 29 not apply. The gasoline shall also meet the maximum vapor pressure  
 30 requirements in section 41-2083, subsections D and F.

31       2. California phase 2 reformulated gasoline, including alternative  
 32 formulations allowed by the predictive model, as adopted by the California  
 33 air resources board pursuant to California code of regulations title 13,  
 34 sections 2261 through 2262.7 and 2265, in effect on January 1, 1997, except  
 35 that the minimum oxygen content standard, including methyl tertiary butyl  
 36 ether, does not apply. The gasoline shall also meet the maximum vapor  
 37 pressure requirements in section 41-2083, subsections D and F.

38       B. ~~From and after November 1, 2000 through March 31, 2001 and from the~~  
 39 ~~period~~ Beginning November 1 through March JANUARY 31 of each subsequent year,  
 40 all gasoline produced and shipped to or within this state and sold or offered  
 41 for sale for use in motor vehicles in a county with a population of one  
 42 million two hundred thousand or more persons and any portion of a county  
 43 contained in area A, subject to an appropriate waiver granted by the  
 44 administrator of the United States environmental protection agency pursuant  
 45 to section 211(c)(4) of the clean air act as defined in section 49-401.01,

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1 shall comply with standards for California phase 2 reformulated gasoline,  
2 including alternative formulations allowed by the predictive model, as  
3 adopted by the California air resources board pursuant to California code of  
4 regulations title 13, sections 2261 through 2262.7 and 2265, in effect on  
5 January 1, 1997 and shall meet the maximum vapor pressure requirements in  
6 section 41-2083, subsections D and F. The fuel described in this subsection  
7 shall meet the requirements of section 41-2123, subsection A, paragraph 1.

8 C. ~~From~~ FOR November 1, 2000 through ~~March~~ JANUARY 31, 2001 and for  
9 each winter season of November through ~~March~~ JANUARY thereafter, the director  
10 of the department of weights and measures shall determine the average levels  
11 of the constituents in the gasoline sold or offered for sale in area A and  
12 shall provide the results of this determination to the director of THE  
13 DEPARTMENT OF environmental quality. The director of THE DEPARTMENT OF  
14 environmental quality shall analyze the data provided by the director of the  
15 department of weights and measures and, no later than July 1, 2001 and each  
16 July thereafter, shall determine the average daily carbon monoxide reductions  
17 resulting from the use of the gasoline specified in subsection B of this  
18 section during the preceding winter season. If the average daily carbon  
19 monoxide reductions resulting from the use of the gasoline specified in  
20 subsection B of this section during the preceding winter season are less than  
21 ninety per cent of the goal of thirty-two tons per day in 2001, thirty-one  
22 tons per day in 2003, thirty tons per day in 2005, twenty-nine tons per day  
23 in 2007, or twenty-eight tons per day in 2009, the director of the department  
24 of environmental quality shall immediately notify the governor, the president  
25 of the senate and the speaker of the house of representatives.

26 D. Any registered supplier or oxygenate blender, as defined in  
27 department rules, may petition the director to request that all registered  
28 suppliers or oxygenate blenders be allowed to comply with any provision of  
29 section 41-2123, subsection A, provided the petitioner can demonstrate that  
30 ethanol supply shortages are imminent.

31 E. The petition shall:

32 1. Identify specific supply conditions that will result in a shortage  
33 of ethanol.

34 2. Identify which oxygenate or oxygenates will be blended into  
35 gasoline for sale or use in area A.

36 3. Demonstrate that the alternative oxygenate blend comes closest to  
37 meeting a three and one-half per cent by weight oxygen content at reasonable  
38 cost.

39 4. Specify a time period for compliance with any provision of section  
40 41-2123, subsection A, not to exceed sixty days.

41 F. The director shall either grant or deny the petition in writing  
42 within seven days of its receipt. Any decision by the director to grant the  
43 petition shall be equally applicable to all registered suppliers or oxygenate  
44 blenders and shall not be selectively applied to any single registered

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1 supplier or oxygenate blender. The petition may be granted only if the  
2 director verifies that the basis for requesting the petition is factual.

3 G. The director may reauthorize a petition if the petitioner can  
4 demonstrate that the conditions have continued. The reauthorization of a  
5 petition shall not exceed thirty days.

6 H. The director of the department of weights and measures shall  
7 consult with the director of the department of environmental quality prior to  
8 granting, reauthorizing or denying any such petition.

9 ~~I. From and after November 1, 1999 through March 31, 2000, the fuels~~  
10 ~~described in subsection A of this section shall meet the requirements of~~  
11 ~~section 41-2123.~~

12 ~~J.~~ I. The director of THE DEPARTMENT OF environmental quality in  
13 consultation with the director of the department of weights and measures  
14 shall adopt by rule:

15 1. Requirements to implement subsections A through E of this section.

16 2. Requirements for record keeping, reporting and analytical methods  
17 for fuel providers to demonstrate compliance with subsections A through E of  
18 this section.

19 J. THE DIRECTOR OF THE DEPARTMENT OF ENVIRONMENTAL QUALITY IN  
20 CONSULTATION WITH THE DIRECTOR OF THE DEPARTMENT OF WEIGHTS AND MEASURES  
21 SHALL ADOPT RULES TO IMPLEMENT THIS SECTION TO BE CONSISTENT WITH APPLICABLE  
22 FEDERAL AND CALIFORNIA STATE FUEL FORMULATION RULES TO THE EXTENT  
23 PRACTICABLE.

24 K. This section does not apply to fuel sold for use at a motor vehicle  
25 manufacturer proving ground or at a motor vehicle racing event.

26 Sec. 3. Department of environmental quality; CARB fuel  
27 formulations; recommendations

28 A. The department of environmental quality shall in consultation with  
29 the department of weights and measures do the following regarding fuels sold  
30 in area A as defined in section 49-541, Arizona Revised Statutes:

31 1. Collect and analyze data on the removal of the months of February  
32 and March from the winter cleaner burning gasoline season under the state  
33 implementation plan and in accordance with section 211(m)(2) of the clean air  
34 act with respect to oxygenate requirements and section 110(1) of the clean  
35 air act with respect to the Reid vapor pressure standard, based on whether  
36 the modeling indicates that these two gasoline standards are not needed  
37 during the months of February and March to attain the federal carbon monoxide  
38 standard. The information shall be collected during the first January and  
39 February immediately following the effective date of section 41-2124, Arizona  
40 Revised Statutes, as amended by section 2 of this act. The information  
41 collected shall be used to evaluate carbon monoxide emissions, ambient air  
42 quality and predicted air quality impacts using the most recent environmental  
43 protection agency models.

44 2. Cooperate with other interested parties in working to revise the  
45 current models used by the United States environmental protection agency to

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1 better estimate the impact of gasoline vapor pressure and oxygen content on  
2 winter season carbon monoxide emissions for late model vehicles.

3 3. As soon as practical, but not later than December 31, 2004, complete  
4 all necessary data collection and analysis to support the submission of a  
5 carbon monoxide state implementation plan amendment for area A addressing the  
6 removal of February and March from the period of required use of California  
7 phase 2 reformulated gasoline.

8 4. As soon as practical, but not later than June 31, 2005, complete  
9 all necessary data collection and analysis to support the submission of ozone  
10 and carbon monoxide state implementation plan revisions for area A addressing  
11 the use of California air resources board phase 3 gasoline.

12 5. The data collection and analysis shall include the estimated  
13 emissions and supply impacts as well as the ability of refineries to supply  
14 gasoline to area A associated with the adoption of California air resources  
15 board phase 3 gasoline standards for the period of November through March of  
16 each year, and California air resources board phase 3 gasoline and federal  
17 phase 2 reformulated gasoline standards for the period of April through  
18 October of each year.

19 B. On or before September 1, 2005, the department of environmental  
20 quality shall report on the activities prescribed by subsection A of this  
21 section.

22 C. The department of weights and measures in consultation with the  
23 department of environmental quality shall conduct at least one public  
24 workshop on the preliminary findings made by the department of environmental  
25 quality pursuant to subsection A of this section prior to submitting the  
26 report and state implementation plan revisions to the United States  
27 environmental protection agency.

28 Sec. 4. Appropriation; purpose

29 Notwithstanding section 49-551, Arizona Revised Statutes, the sum of  
30 \$135,000 is appropriated in fiscal year 2004-2005 from the monies received by  
31 the air quality fund pursuant to section 49-543, Arizona Revised Statutes, to  
32 the department of environmental quality for the purposes of collecting and  
33 analyzing data in accordance with section 3 of this act relating to  
34 amendments to the state implementation plan. Any monies not spent by  
35 November 30, 2005 shall be returned to the air quality fund.

36 Sec. 5. Conditional enactment; notice

37 A. Section 41-2124, Arizona Revised Statutes, as amended by section 1  
38 of this act, is not effective unless on or before November 1, 2007 the  
39 administrator of the United States environmental protection agency approves a  
40 revision to the state implementation plan as defined in section 49-401.01,  
41 Arizona Revised Statutes, that incorporates the changes contained in section  
42 1 of this act.

43 B. Section 41-2124, Arizona Revised Statutes, as amended by section 2  
44 of this act, is not effective unless on or before November 1, 2007 the  
45 administrator of the United States environmental protection agency approves a

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1 revision to the state implementation plan as defined in section 49-401.01,  
2 Arizona Revised Statutes, that incorporates the changes contained in section  
3 2 of this act.

4 C. The director of the department of environmental quality shall  
5 promptly provide written notice to the director of the Arizona legislative  
6 council of the following:

7 1. The date of approval of a revision to the state implementation plan  
8 that incorporates the changes contained in section 1 of this act or the  
9 failure to incorporate those changes on or before November 1, 2007.

10 2. The date of approval of a revision to the state implementation plan  
11 that incorporates the changes contained in section 2 of this act or the  
12 failure to incorporate those changes on or before November 1, 2007.

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## **Appendix B**

**Amendment to Arizona Laws; Arizona Laws 2005, Chapter 104,  
(Senate Bill 1275)**

PLEASE NOTE: In most BUT NOT ALL instances, the page and line numbering of bills on this web site correspond to the page and line numbering of the official printed version of the bills.

House Engrossed Senate Bill

State of Arizona  
Senate  
Forty-seventh Legislature  
First Regular Session  
2005

# SENATE BILL 1275

## AN ACT

AMENDING SECTIONS 41-2083 AND 41-2123, ARIZONA REVISED STATUTES; AMENDING SECTION 41-2124, ARIZONA REVISED STATUTES, AS AMENDED BY LAWS 2000, CHAPTER 405, SECTION 21; AMENDING SECTION 41-2124, ARIZONA REVISED STATUTES, AS AMENDED BY LAWS 2004, CHAPTER 293, SECTION 1; AMENDING SECTION 41-2124, ARIZONA REVISED STATUTES, AS AMENDED BY LAWS 2004, CHAPTER 293, SECTION 2; AMENDING SECTION 41-2124, ARIZONA REVISED STATUTES, AS AMENDED BY LAWS 2004, CHAPTER 293, SECTIONS 1 AND 2; RELATING TO MOTOR FUEL; PROVIDING FOR CONDITIONAL ENACTMENT.

(TEXT OF BILL BEGINS ON NEXT PAGE)

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1 Be it enacted by the Legislature of the State of Arizona:

2 Section 1. Section 41-2083, Arizona Revised Statutes, is amended to  
3 read:

4 41-2083. Standards for motor fuel; exceptions

5 A. Except as provided in subsections C, D, E, F, G, K, L, M and N of  
6 this section, a retail seller or fleet owner shall not store, sell or expose  
7 or offer for sale any motor fuel, kerosene, oil or other liquid or gaseous  
8 fuel or lubricating oil, lubricant, mixtures of lubricants or other similar  
9 products if the product fails to meet the standards specified in this section  
10 and in the rules adopted by the director.

11 B. A person shall not misrepresent the nature, origination, quality,  
12 grade or identity of any product specified in subsection A of this section or  
13 represent the nature, origination, quality, grade or identity of such product  
14 in any manner calculated or tending to mislead or in any way deceive.

15 C. After consultation with the director of the department of  
16 environmental quality, the standards and test methods for motor fuels shall  
17 be established by the director of the department of weights and measures by  
18 rule.

19 D. Maximum vapor pressure for gasoline that is supplied or sold by any  
20 person and that is intended as a final product for the fueling of motor  
21 vehicles in a county with a population of one million two hundred thousand or  
22 more persons and any portion of a county contained in area A as defined in  
23 section 49-541 shall be 9.0 pounds per square inch from and after September  
24 30 through ~~March~~ JANUARY 31 of each year. Fuel used in motor vehicles at a  
25 manufacturer's proving ground or a motor vehicle racing event as defined by  
26 section 41-2121 is exempt from this subsection.

27 E. From and after September 30 through March 31 of each year a person  
28 shall not supply or sell gasoline that exceeds the ASTM D4814 class A vapor  
29 pressure/distillation class ten volume per cent evaporated distillation  
30 temperature.

31 F. Maximum vapor pressure for gasoline that is supplied or sold by any  
32 person and that is intended as a final product for the fueling of motor  
33 vehicles in a county with a population of one million two hundred thousand  
34 persons or more and any portion of a county contained in area A as defined in  
35 section 49-541 shall be 7.0 pounds per square inch from and after May 31  
36 through September 30 of each year. Fuel used in motor vehicles at a  
37 manufacturer's proving ground or a motor vehicle racing event as defined by  
38 section 41-2121 is exempt from this subsection.

39 G. Exclusively for the purposes of transportation conformity and only  
40 if the administrator of the United States environmental protection agency  
41 fails to approve the applicable plan required pursuant to section 49-406,  
42 maximum vapor pressure for gasoline that is supplied or sold by any person  
43 and that is intended as a final product for the fueling of motor vehicles in  
44 area B as defined in section 49-541 shall be ten pounds per square inch from  
45 and after September 30 through March 31 of each year. Fuel used in motor

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1 vehicles at a manufacturer's proving ground or a motor vehicle racing event  
2 as defined by section 41-2121 is exempt from this subsection.

3 H. Notwithstanding subsections D, F and G of this section, the  
4 director of the department of weights and measures in consultation with the  
5 director of the department of environmental quality shall approve alternate  
6 fuel control measures that are submitted by manufacturers or suppliers of  
7 gasoline and that the directors determine will result in either of the  
8 following:

9 1. Motor vehicle carbon monoxide emissions that are equal to or less  
10 than emissions that result under compliance with subsection D of this section  
11 and section 41-2123. In making this determination, the director of the  
12 department of weights and measures and the director of the department of  
13 environmental quality shall compare the emissions of the alternate fuel  
14 control measure with the emissions of a fuel with a maximum vapor pressure  
15 standard as prescribed by this section and with the minimum oxygen content or  
16 percentage by volume of ethanol as prescribed by section 41-2123.

17 2. Motor vehicle non-methane hydrocarbon emissions that are equal to  
18 or less than the emissions that result under compliance with subsection F of  
19 this section. In making this determination, the director of the department  
20 of weights and measures and the director of the department of environmental  
21 quality shall compare the motor vehicle non-methane hydrocarbon emissions of  
22 the alternate fuel control measure with the motor vehicle non-methane  
23 hydrocarbon emissions of a fuel that complies with the maximum vapor pressure  
24 standard as prescribed by subsection F of this section.

25 I. Any alternate fuel control measures that are approved shall not  
26 increase emissions of non-methane hydrocarbons, particulates, carbon monoxide  
27 or oxides of nitrogen. Alternate fuel control measures approved pursuant to  
28 subsection H of this section and this subsection may be used by any  
29 manufacturer or supplier of gasoline unless the approval is rescinded more  
30 than one hundred eighty days before the first day of a gasoline control  
31 period. Manufacturers and suppliers who use an approved alternate fuel  
32 control measure shall annually submit a compliance plan to the director of  
33 the department of weights and measures no later than sixty days before the  
34 first day of a gasoline control period.

35 J. A person shall not sell or offer or expose for sale diesel fuel  
36 grade 1, 2 or 4 as defined in ASTM D975 that contains sulfur in excess of  
37 five hundred parts per million for use in area A as defined in section  
38 49-541.

39 K. A person shall not sell or offer or expose for sale biodiesel that  
40 is not tested or does not meet the specifications established by ASTM D6751  
41 or any blend of biodiesel and diesel fuel that is not tested or does not meet  
42 the specifications established by ASTM D975 and that contains sulfur in  
43 excess of five hundred parts per million for use in area A as defined in  
44 section 49-541.

45 L. A person ~~that~~ WHO blends biodiesel that is intended as a final  
46 product for the fueling of motor vehicles shall report to the director by the

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1 fifteenth day of each month the quantity and quality of biodiesel shipped to  
 2 or produced in this state during the preceding month. A person who supplies  
 3 biodiesel subject to this subsection shall report the following by batch:

- 4 1. The percentage of biodiesel in a final blend.
- 5 2. The volume of the finished product.
- 6 3. For neat biodiesel, the results of analysis for those parameters  
 7 established by ASTM D6751.
- 8 4. For biodiesel blended with any diesel fuel, the results of the  
 9 analysis of the following motor fuel parameters as established by ASTM D975:
- 10 (a) Sulfur content.
- 11 (b) Aromatic hydrocarbon content.
- 12 (c) Cetane number.
- 13 (d) Specific gravity.
- 14 (e) American petroleum institute gravity.
- 15 (f) The temperatures at which ten per cent, fifty per cent and ninety  
 16 per cent of the diesel fuel boiled off during distillation.

17 M. The report required by subsection L of this section shall be on a  
 18 form prescribed by the director and shall contain a certification of  
 19 truthfulness and accuracy of the data submitted and a statement of the  
 20 supplier's consent permitting the department or its authorized agent to  
 21 collect samples and access records as provided in rules adopted by the  
 22 department. A corporate officer who is responsible for operations at the  
 23 facility that produces or ships the final product shall sign the report.

24 N. A person shall label dispensers at which biodiesel is dispensed in  
 25 such a manner as to notify other persons of the volume percentage of  
 26 biodiesel in the finished product.

27 Sec. 2. Section 41-2123, Arizona Revised Statutes, is amended to  
 28 read:

29 41-2123. Area A; sale of gasoline; oxygen content

30 A. From and after November 1 through ~~March~~ JANUARY 31 of each year, ~~+~~  
 31 ~~+~~ all gasoline that is supplied or sold by any person and that is  
 32 intended as a final product for the fueling of motor vehicles within a county  
 33 with a population of one million two hundred thousand or more persons and any  
 34 portion of a county contained in area A or that is consumed in a motor  
 35 vehicle in a county with a population of one million two hundred thousand or  
 36 more persons and any portion of a county contained in area A by a fleet  
 37 owner:

38 1. Shall CONTAIN, for a gasoline-ethanol blend, ~~contain~~ not less than  
 39 ten per cent by volume of ethanol nor more than the maximum percentage of  
 40 oxygen allowed by provisions of a waiver issued or other limits established  
 41 by the United States environmental protection agency.

42 ~~2. All gasoline that is supplied or sold by any person and that is~~  
 43 ~~intended as a final product for the fueling of motor vehicles within a county~~  
 44 ~~with a population of one million two hundred thousand or more persons and any~~  
 45 ~~portion of a county contained in area A or that is consumed in a motor~~  
 46 ~~vehicle within a county with a population of one million two hundred thousand~~

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~~or more persons and any portion of a county contained in area A by a fleet owner~~

2. Shall CONTAIN, for a blend other than a gasoline-ethanol blend, ~~contain~~ not less than 2.7 per cent by weight of oxygen nor more than the maximum percentage of oxygen allowed by provisions of a waiver issued or other limits established by the United States environmental protection agency.

3. MAY CONTAIN, FOR A GASOLINE-ETHANOL BLEND, LESS THAN TEN PER CENT BY VOLUME OF ETHANOL ON APPROVAL BY THE DIRECTOR OF A PETITION FILED PURSUANT TO SECTION 41-2124, SUBSECTION D. THE APPROVAL APPLIES TO ALL REGISTERED SUPPLIERS AND OXYGENATE BLENDERS, AND FOR THE DURATION OF THAT APPROVAL, THE SUPPLY OR SALE OF GASOLINE-ETHANOL BLENDS THAT CONTAIN LESS THAN TEN PER CENT BY VOLUME OF ETHANOL IS NOT SUBJECT TO SUBSECTIONS B AND C OF THIS SECTION.

B. Notwithstanding subsection A of this section, the director of the department of weights and measures in consultation with the director of the department of environmental quality shall approve alternate fuel control measures that are submitted by manufacturers or suppliers of gasoline and that the directors determine will result in motor vehicle carbon monoxide emissions that are equal to or less than emissions that result under compliance with subsection A of this section and section 41-2083. In making this determination, the director of the department of weights and measures and the director of the department of environmental quality shall compare the emissions of the alternate fuel control measure with the emissions of a fuel with a maximum vapor pressure standard as prescribed by section 41-2083 and with the minimum oxygen content or percentage by volume of ethanol as prescribed by this section.

C. Any alternate fuel control measures that are approved shall not increase emissions of non-methane hydrocarbons, particulates, carbon monoxide or oxides of nitrogen. Alternate fuel control measures approved pursuant to subsection B of this section and this subsection may be used by any manufacturer or supplier of gasoline unless the approval is rescinded more than one hundred eighty days before the first day of a gasoline control period. Manufacturers and suppliers who use an approved alternate fuel control measure shall annually submit a compliance plan to the director of the department of weights and measures no later than sixty days before the first day of a gasoline control period.

Sec. 3. Section 41-2124, Arizona Revised Statutes, as amended by Laws 2000, chapter 405, section 21, is amended to read:

41-2124. Area A; fuel reformulation; rules

A. From and after May 1, 1999, all gasoline produced and shipped to or within this state and sold or offered for sale for use in motor vehicles in a county with a population of one million two hundred thousand or more persons and any portion of a county contained in area A, subject to an appropriate waiver granted by the administrator of the United States environmental protection agency pursuant to section 211(c)(4) of the clean air act as

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1 defined in section 49-401.01, shall comply with either of the following fuel  
2 reformulation options:

3 1. A gasoline that meets standards for federal phase II reformulated  
4 gasoline, as provided in 40 Code of Federal Regulations section 80.41,  
5 paragraphs (e) through (h), in effect on January 1, 1999, except that the  
6 minimum oxygen content standard, ~~including methyl tertiary butyl ether~~, does  
7 not apply. The gasoline shall also meet the maximum vapor pressure  
8 requirements in section 41-2083, subsections D and F.

9 2. California phase 2 reformulated gasoline, including alternative  
10 formulations allowed by the predictive model, as adopted by the California  
11 air resources board pursuant to California code of regulations title 13,  
12 sections 2261 through 2262.7 and 2265, in effect on January 1, 1997, except  
13 that the minimum oxygen content standard, ~~including methyl tertiary butyl~~  
14 ~~ether~~, does not apply. The gasoline shall also meet the maximum vapor  
15 pressure requirements in section 41-2083, subsections D and F.

16 B. From and after November 1, 2000 through March 31, 2001 and from the  
17 period beginning November 1 through March 31 of each subsequent year, all  
18 gasoline produced and shipped to or within this state and sold or offered for  
19 sale for use in motor vehicles in a county with a population of one million  
20 two hundred thousand or more persons and any portion of a county contained in  
21 area A, subject to an appropriate waiver granted by the administrator of the  
22 United States environmental protection agency pursuant to section 211(c)(4)  
23 of the clean air act as defined in section 49-401.01, shall comply with  
24 standards for California phase 2 reformulated gasoline, including alternative  
25 formulations allowed by the predictive model, as adopted by the California  
26 air resources board pursuant to California code of regulations title 13,  
27 sections 2261 through 2262.7 and 2265, in effect on January 1, 1997 and shall  
28 meet the maximum vapor pressure requirements in section 41-2083, subsections  
29 D and F. The fuel described in this subsection shall meet the requirements  
30 of section 41-2123, subsection A, paragraph 1.

31 C. From November 1, 2000 through March 31, 2001 and for each winter  
32 season of November through March thereafter, the director of the department  
33 of weights and measures shall determine the average levels of the  
34 constituents in the gasoline sold or offered for sale in area A and shall  
35 provide the results of this determination to the director of environmental  
36 quality. The director of environmental quality shall analyze the data  
37 provided by the director of the department of weights and measures and, no  
38 later than July 1, 2001 and each July thereafter, shall determine the average  
39 daily carbon monoxide reductions resulting from the use of the gasoline  
40 specified in subsection B of this section during the preceding winter season.  
41 If the average daily carbon monoxide reductions resulting from the use of the  
42 gasoline specified in subsection B of this section during the preceding  
43 winter season are less than ninety per cent of the goal of thirty-two tons  
44 per day in 2001, thirty-one tons per day in 2003, thirty tons per day in  
45 2005, twenty-nine tons per day in 2007, ~~—~~ or twenty-eight tons per day in  
46 2009, the director of the department of environmental quality shall

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1 immediately notify the governor, the president of the senate and the speaker  
2 of the house of representatives.

3 D. Any registered supplier or oxygenate blender, as defined in  
4 department rules, may petition the director to request that all registered  
5 suppliers or oxygenate blenders be allowed to comply with any provision of  
6 section 41-2123, subsection A, provided the petitioner can demonstrate that  
7 ethanol supply shortages are imminent.

8 E. The petition shall:

9 1. Identify specific supply conditions that will result in a shortage  
10 of ethanol.

11 2. Identify which oxygenate or oxygenates **AND THE CONCENTRATION THAT**  
12 will be blended into gasoline for sale or use in area A.

13 3. Demonstrate that the alternative oxygenate blend comes closest to  
14 meeting a three and one-half per cent by weight oxygen content at reasonable  
15 cost, **UNLESS THE REGISTERED SUPPLIER OR OXYGENATE BLENDER IS PETITIONING TO**  
16 **USE A GASOLINE-ETHANOL BLEND CONTAINING LESS THAN TEN PER CENT BY VOLUME OF**  
17 **ETHANOL.**

18 4. Specify a time period for compliance with any provision of section  
19 41-2123, subsection A, not to exceed sixty days.

20 F. The director shall either grant or deny the petition in writing  
21 within seven days of its receipt. Any decision by the director to grant the  
22 petition shall be equally applicable to all registered suppliers or oxygenate  
23 blenders and shall not be selectively applied to any single registered  
24 supplier or oxygenate blender. The petition may be granted only if the  
25 director verifies that the basis for requesting the petition is factual.

26 G. The director may reauthorize a petition if the petitioner can  
27 demonstrate that the conditions have continued. The reauthorization of a  
28 petition shall not exceed thirty days.

29 H. The director of the department of weights and measures shall  
30 consult with the director of the department of environmental quality prior to  
31 granting, reauthorizing or denying any such petition.

32 ~~I. From and after November 1, 1999 through March 31, 2000, the fuels~~  
33 ~~described in subsection A of this section shall meet the requirements of~~  
34 ~~section 41-2123.~~

35 ~~J.~~ I. The director of environmental quality in consultation with the  
36 director of the department of weights and measures shall adopt by rule:

37 1. Requirements to implement subsections A through E of this section.  
38 2. Requirements for record keeping, reporting and analytical methods  
39 for fuel providers to demonstrate compliance with subsections A through E of  
40 this section.

41 ~~K.~~ J. This section does not apply to fuel sold for use at a motor  
42 vehicle manufacturer proving ground or at a motor vehicle racing event.

43 Sec. 4. Section 41-2124, Arizona Revised Statutes, as amended by Laws  
44 2004, chapter 293, section 1, is amended to read:

45 41-2124. Area A; fuel reformulation; rules



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1           A. All gasoline produced and shipped to or within this state and sold  
2 or offered for sale for use in motor vehicles in a county with a population  
3 of one million two hundred thousand or more persons and any portion of a  
4 county contained in area A, subject to an appropriate waiver granted by the  
5 administrator of the United States environmental protection agency pursuant  
6 to section 211(c)(4) of the clean air act as defined in section 49-401.01,  
7 shall comply with either of the following fuel reformulation options:

8           1. A gasoline that meets standards for federal phase II reformulated  
9 gasoline, as provided in 40 Code of Federal Regulations section 80.41,  
10 paragraphs (e) through (h), in effect on January 1, 1999, except that the  
11 minimum oxygen content standard, ~~including methyl tertiary butyl ether,~~ does  
12 not apply. The gasoline shall also meet the maximum vapor pressure  
13 requirements in section 41-2083, subsections D and F.

14           2. California phase 3 reformulated gasoline, including alternative  
15 formulations allowed by the predictive model, as adopted by the California  
16 air resources board pursuant to California code of regulations title 13,  
17 sections 2261 through 2263, 2265 and 2266.5, in effect on May 1, 2003,  
18 including vapor pressure requirements contained in section 2262.4.

19           B. From and after November 1, 2000 through March 31, 2001 and from the  
20 period beginning November 1 through March 31 of each subsequent year, all  
21 gasoline produced and shipped to or within this state and sold or offered for  
22 sale for use in motor vehicles in a county with a population of one million  
23 two hundred thousand or more persons and any portion of a county contained in  
24 area A, subject to an appropriate waiver granted by the administrator of the  
25 United States environmental protection agency pursuant to section 211(c)(4)  
26 of the clean air act as defined in section 49-401.01, shall comply with  
27 standards for California phase 3 reformulated gasoline, including alternative  
28 formulations allowed by the predictive model, as adopted by the California  
29 air resources board pursuant to California code of regulations title 13,  
30 sections 2261 through 2263, 2265 and 2266.5, in effect on May 1, 2003 and  
31 shall meet the maximum vapor pressure requirements in section 41-2083,  
32 subsections D and F. The fuel described in this subsection shall meet the  
33 requirements of section 41-2123, subsection A, paragraph 1.

34           C. From November 1, 2000 through March 31, 2001 and for each winter  
35 season of November through March thereafter, the director of the department  
36 of weights and measures shall determine the average levels of the  
37 constituents in the gasoline sold or offered for sale in area A and shall  
38 provide the results of this determination to the director of the department  
39 of environmental quality. The director of the department of environmental  
40 quality shall analyze the data provided by the director of the department of  
41 weights and measures and, no later than July 1, 2001 and each July  
42 thereafter, shall determine the average daily carbon monoxide reductions  
43 resulting from the use of the gasoline specified in subsection B of this  
44 section during the preceding winter season. If the average daily carbon  
45 monoxide reductions resulting from the use of the gasoline specified in  
46 subsection B of this section during the preceding winter season are less than

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1 ninety per cent of the goal of thirty-two tons per day in 2001, thirty-one  
2 tons per day in 2003, thirty tons per day in 2005, twenty-nine tons per day  
3 in 2007, or twenty-eight tons per day in 2009, the director of the  
4 department of environmental quality shall immediately notify the governor,  
5 the president of the senate and the speaker of the house of representatives.

6 D. Any registered supplier or oxygenate blender, as defined in  
7 department rules, may petition the director to request that all registered  
8 suppliers or oxygenate blenders be allowed to comply with any provision of  
9 section 41-2123, subsection A, provided the petitioner can demonstrate that  
10 ethanol supply shortages are imminent.

11 E. The petition shall:

12 1. Identify specific supply conditions that will result in a shortage  
13 of ethanol.

14 2. Identify which oxygenate or oxygenates AND THE CONCENTRATION THAT  
15 will be blended into gasoline for sale or use in area A.

16 3. Demonstrate that the alternative oxygenate blend comes closest to  
17 meeting a three and one-half per cent by weight oxygen content at reasonable  
18 cost, UNLESS THE REGISTERED SUPPLIER OR OXYGENATE BLENDER IS PETITIONING TO  
19 USE A GASOLINE-ETHANOL BLEND CONTAINING LESS THAN TEN PER CENT BY VOLUME OF  
20 ETHANOL.

21 4. Specify a time period for compliance with any provision of section  
22 41-2123, subsection A, not to exceed sixty days.

23 F. The director shall either grant or deny the petition in writing  
24 within seven days of its receipt. Any decision by the director to grant the  
25 petition shall be equally applicable to all registered suppliers or oxygenate  
26 blenders and shall not be selectively applied to any single registered  
27 supplier or oxygenate blender. The petition may be granted only if the  
28 director verifies that the basis for requesting the petition is factual.

29 G. The director may reauthorize a petition if the petitioner can  
30 demonstrate that the conditions have continued. The reauthorization of a  
31 petition shall not exceed thirty days.

32 H. The director of the department of weights and measures shall  
33 consult with the director of the department of environmental quality prior to  
34 granting, reauthorizing or denying any such petition.

35 I. The director of the department of environmental quality in  
36 consultation with the director of the department of weights and measures  
37 shall adopt by rule:

38 1. Requirements to implement subsections A through E of this section.

39 2. Requirements for record keeping, reporting and analytical methods  
40 for fuel providers to demonstrate compliance with subsections A through E of  
41 this section.

42 J. The director of the department of environmental quality in  
43 consultation with the director of the department of weights and measures  
44 shall adopt rules to implement this section to be consistent with applicable  
45 federal and California state fuel formulation rules to the extent  
46 practicable.

S.B. 1275

1 K. This section does not apply to fuel sold for use at a motor vehicle  
2 manufacturer proving ground or at a motor vehicle racing event.

3 Sec. 5. Section 41-2124, Arizona Revised Statutes, as amended by Laws  
4 2004, chapter 293, section 2, is amended to read:

5 41-2124. Area A: fuel reformulation: rules

6 A. From and after May 1, 1999, all gasoline produced and shipped to or  
7 within this state and sold or offered for sale for use in motor vehicles in a  
8 county with a population of one million two hundred thousand or more persons  
9 and any portion of a county contained in area A, subject to an appropriate  
10 waiver granted by the administrator of the United States environmental  
11 protection agency pursuant to section 211(c)(4) of the clean air act as  
12 defined in section 49-401.01, shall comply with either of the following fuel  
13 reformulation options:

14 1. A gasoline that meets standards for federal phase II reformulated  
15 gasoline, as provided in 40 Code of Federal Regulations section 80.41,  
16 paragraphs (e) through (h), in effect on January 1, 1999, except that the  
17 minimum oxygen content standard, ~~including methyl tertiary butyl ether,~~ does  
18 not apply. The gasoline shall also meet the maximum vapor pressure  
19 requirements in section 41-2083, subsections D and F.

20 2. California phase 2 reformulated gasoline, including alternative  
21 formulations allowed by the predictive model, as adopted by the California  
22 air resources board pursuant to California code of regulations title 13,  
23 sections 2261 through 2262.7 and 2265, in effect on January 1, 1997, except  
24 that the minimum oxygen content standard, ~~including methyl tertiary butyl~~  
25 ~~ether,~~ does not apply. The gasoline shall also meet the maximum vapor  
26 pressure requirements in section 41-2083, subsections D and F.

27 B. Beginning November 1 through January 31 of each year, all gasoline  
28 produced and shipped to or within this state and sold or offered for sale for  
29 use in motor vehicles in a county with a population of one million two  
30 hundred thousand or more persons and any portion of a county contained in  
31 area A, subject to an appropriate waiver granted by the administrator of the  
32 United States environmental protection agency pursuant to section 211(c)(4)  
33 of the clean air act as defined in section 49-401.01, shall comply with  
34 standards for California phase 2 reformulated gasoline, including alternative  
35 formulations allowed by the predictive model, as adopted by the California  
36 air resources board pursuant to California code of regulations title 13,  
37 sections 2261 through 2262.7 and 2265, in effect on January 1, 1997 and shall  
38 meet the maximum vapor pressure requirements in section 41-2083, subsections  
39 D and F. The fuel described in this subsection shall meet the requirements  
40 of section 41-2123, subsection A, paragraph 1.

41 C. For November 1, 2000 through January 31, 2001 and for each winter  
42 season of November through January thereafter, the director of the department  
43 of weights and measures shall determine the average levels of the  
44 constituents in the gasoline sold or offered for sale in area A and shall  
45 provide the results of this determination to the director of the department  
46 of environmental quality. The director of the department of environmental

1 quality shall analyze the data provided by the director of the department of  
2 weights and measures and, no later than July 1, 2001 and each July  
3 thereafter, shall determine the average daily carbon monoxide reductions  
4 resulting from the use of the gasoline specified in subsection B of this  
5 section during the preceding winter season. If the average daily carbon  
6 monoxide reductions resulting from the use of the gasoline specified in  
7 subsection B of this section during the preceding winter season are less than  
8 ninety per cent of the goal of thirty-two tons per day in 2001, thirty-one  
9 tons per day in 2003, thirty tons per day in 2005, twenty-nine tons per day  
10 in 2007, ~~or~~ twenty-eight tons per day in 2009, the director of the  
11 department of environmental quality shall immediately notify the governor,  
12 the president of the senate and the speaker of the house of representatives.

13 D. Any registered supplier or oxygenate blender, as defined in  
14 department rules, may petition the director to request that all registered  
15 suppliers or oxygenate blenders be allowed to comply with any provision of  
16 section 41-2123, subsection A, provided the petitioner can demonstrate that  
17 ethanol supply shortages are imminent.

18 E. The petition shall:

19 1. Identify specific supply conditions that will result in a shortage  
20 of ethanol.

21 2. Identify which oxygenate or oxygenates AND THE CONCENTRATION THAT  
22 will be blended into gasoline for sale or use in area A.

23 3. Demonstrate that the alternative oxygenate blend comes closest to  
24 meeting a three and one-half per cent by weight oxygen content at reasonable  
25 cost, UNLESS THE REGISTERED SUPPLIER OR OXYGENATE BLENDER IS PETITIONING TO  
26 USE A GASOLINE-ETHANOL BLEND CONTAINING LESS THAN TEN PER CENT BY VOLUME OF  
27 ETHANOL.

28 4. Specify a time period for compliance with any provision of section  
29 41-2123, subsection A, not to exceed sixty days.

30 F. The director shall either grant or deny the petition in writing  
31 within seven days of its receipt. Any decision by the director to grant the  
32 petition shall be equally applicable to all registered suppliers or oxygenate  
33 blenders and shall not be selectively applied to any single registered  
34 supplier or oxygenate blender. The petition may be granted only if the  
35 director verifies that the basis for requesting the petition is factual.

36 G. The director may reauthorize a petition if the petitioner can  
37 demonstrate that the conditions have continued. The reauthorization of a  
38 petition shall not exceed thirty days.

39 H. The director of the department of weights and measures shall  
40 consult with the director of the department of environmental quality prior to  
41 granting, reauthorizing or denying any such petition.

42 I. The director of the department of environmental quality in  
43 consultation with the director of the department of weights and measures  
44 shall adopt by rule:

45 1. Requirements to implement subsections A through E of this section.

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2. Requirements for record keeping, reporting and analytical methods for fuel providers to demonstrate compliance with subsections A through E of this section.

J. The director of the department of environmental quality in consultation with the director of the department of weights and measures shall adopt rules to implement this section to be consistent with applicable federal and California state fuel formulation rules to the extent practicable.

K. This section does not apply to fuel sold for use at a motor vehicle manufacturer proving ground or at a motor vehicle racing event.

Sec. 6. Section 41-2124, Arizona Revised Statutes, as amended by Laws 2004, chapter 293, sections 1 and 2, is amended to read:

41-2124. Area A; fuel reformulation; rules

A. All gasoline produced and shipped to or within this state and sold or offered for sale for use in motor vehicles in a county with a population of one million two hundred thousand or more persons and any portion of a county contained in area A, subject to an appropriate waiver granted by the administrator of the United States environmental protection agency pursuant to section 211(c)(4) of the clean air act as defined in section 49-401.01, shall comply with either of the following fuel reformulation options:

1. A gasoline that meets standards for federal phase II reformulated gasoline, as provided in 40 Code of Federal Regulations section 80.41, paragraphs (e) through (h), in effect on January 1, 1999, except that the minimum oxygen content standard, ~~including methyl tertiary butyl ether~~, does not apply. The gasoline shall also meet the maximum vapor pressure requirements in section 41-2083, subsections D and F.

2. California phase 3 reformulated gasoline, including alternative formulations allowed by the predictive model, as adopted by the California air resources board pursuant to California code of regulations title 13, sections 2261 through 2263, 2265 and 2266.5, in effect on May 1, 2003, including vapor pressure requirements contained in section 2262.4.

B. Beginning November 1 through January 31 of each year, all gasoline produced and shipped to or within this state and sold or offered for sale for use in motor vehicles in a county with a population of one million two hundred thousand or more persons and any portion of a county contained in area A, subject to an appropriate waiver granted by the administrator of the United States environmental protection agency pursuant to section 211(c)(4) of the clean air act as defined in section 49-401.01, shall comply with standards for California phase 3 reformulated gasoline, including alternative formulations allowed by the predictive model, as adopted by the California air resources board pursuant to California code of regulations title 13, sections 2261 through 2263, 2265 and 2266.5, in effect on May 1, 2003 and shall meet the maximum vapor pressure requirements in section 41-2083, subsections D and F. The fuel described in this subsection shall meet the requirements of section 41-2123, subsection A, paragraph 1.

1 C. For November 1, 2000 through January 31, 2001 and for each winter  
2 season of November through January thereafter, the director of the department  
3 of weights and measures shall determine the average levels of the  
4 constituents in the gasoline sold or offered for sale in area A and shall  
5 provide the results of this determination to the director of the department  
6 of environmental quality. The director of the department of environmental  
7 quality shall analyze the data provided by the director of the department of  
8 weights and measures and, no later than July 1, 2001 and each July  
9 thereafter, shall determine the average daily carbon monoxide reductions  
10 resulting from the use of the gasoline specified in subsection B of this  
11 section during the preceding winter season. If the average daily carbon  
12 monoxide reductions resulting from the use of the gasoline specified in  
13 subsection B of this section during the preceding winter season are less than  
14 ninety per cent of the goal of thirty-two tons per day in 2001, thirty-one  
15 tons per day in 2003, thirty tons per day in 2005, twenty-nine tons per day  
16 in 2007, ~~—~~ or twenty-eight tons per day in 2009, the director of the  
17 department of environmental quality shall immediately notify the governor,  
18 the president of the senate and the speaker of the house of representatives.

19 D. Any registered supplier or oxygenate blender, as defined in  
20 department rules, may petition the director to request that all registered  
21 suppliers or oxygenate blenders be allowed to comply with any provision of  
22 section 41-2123, subsection A, provided the petitioner can demonstrate that  
23 ethanol supply shortages are imminent.

24 E. The petition shall:

25 1. Identify specific supply conditions that will result in a shortage  
26 of ethanol.

27 2. Identify which oxygenate or oxygenates AND THE CONCENTRATION THAT  
28 will be blended into gasoline for sale or use in area A.

29 3. Demonstrate that the alternative oxygenate blend comes closest to  
30 meeting a three and one-half per cent by weight oxygen content at reasonable  
31 cost, UNLESS THE REGISTERED SUPPLIER OR OXYGENATE BLENDER IS PETITIONING TO  
32 USE A GASOLINE-ETHANOL BLEND CONTAINING LESS THAN TEN PER CENT BY VOLUME OF  
33 ETHANOL.

34 4. Specify a time period for compliance with any provision of section  
35 41-2123, subsection A, not to exceed sixty days.

36 F. The director shall either grant or deny the petition in writing  
37 within seven days of its receipt. Any decision by the director to grant the  
38 petition shall be equally applicable to all registered suppliers or oxygenate  
39 blenders and shall not be selectively applied to any single registered  
40 supplier or oxygenate blender. The petition may be granted only if the  
41 director verifies that the basis for requesting the petition is factual.

42 G. The director may reauthorize a petition if the petitioner can  
43 demonstrate that the conditions have continued. The reauthorization of a  
44 petition shall not exceed thirty days.

S.B. 1275

1           H. The director of the department of weights and measures shall  
2 consult with the director of the department of environmental quality prior to  
3 granting, reauthorizing or denying any such petition.

4           I. The director of the department of environmental quality in  
5 consultation with the director of the department of weights and measures  
6 shall adopt by rule:

7           1. Requirements to implement subsections A through E of this section.

8           2. Requirements for record keeping, reporting and analytical methods  
9 for fuel providers to demonstrate compliance with subsections A through E of  
10 this section.

11          J. The director of the department of environmental quality in  
12 consultation with the director of the department of weights and measures  
13 shall adopt rules to implement this section to be consistent with applicable  
14 federal and California state fuel formulation rules to the extent  
15 practicable.

16          K. This section does not apply to fuel sold for use at a motor vehicle  
17 manufacturer proving ground or at a motor vehicle racing event.

18          Sec. 7. Conditional enactment

19          A. Section 41-2083, Arizona Revised Statutes, as amended by section 1  
20 of this act and section 41-2123, Arizona Revised Statutes, as amended by  
21 section 2 of this act, are not effective unless on or before November 1, 2007  
22 the administrator of the United States environmental protection agency  
23 approves a revision to the state implementation plan as defined in section  
24 49-401.01, Arizona Revised Statutes, that incorporates the changes contained  
25 in sections 1 and 2 of this act.

26          B. Section 41-2124, Arizona Revised Statutes, as amended by Laws 2004,  
27 chapter 293, section 1 and section 4 of this act, is not effective unless  
28 only the condition prescribed in Laws 2004, chapter 293, section 5,  
29 subsection A is met and notice is provided pursuant to Laws 2004, chapter  
30 293, section 5, subsection C.

31          C. Section 41-2124, Arizona Revised Statutes, as amended by Laws 2004,  
32 chapter 293, section 2 and section 5 of this act, is not effective unless  
33 only the condition prescribed in Laws 2004, chapter 293, section 5,  
34 subsection B is met and notice is provided pursuant to Laws 2004, chapter  
35 293, section 5, subsection C.

36          D. Section 41-2124, Arizona Revised Statutes, as amended by Laws 2004,  
37 chapter 293, sections 1 and 2 and section 6 of this act, is not effective  
38 unless the conditions prescribed in Laws 2004, chapter 293, section 5,  
39 subsections A and B are met and notice is provided pursuant to Laws 2004,  
40 chapter 293, section 5, subsection C.

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# **Appendix C**

## **Impacts of Eliminating Maricopa County Wintertime Gasoline Standards on Emissions and Ambient Concentrations of CO in February and March**

Sierra Research, Inc.  
January 24, 2005

Report No. SR2005-01-01

# **Impacts of Eliminating Maricopa County Wintertime Gasoline Standards on Emissions and Ambient Concentrations of CO in February and March**

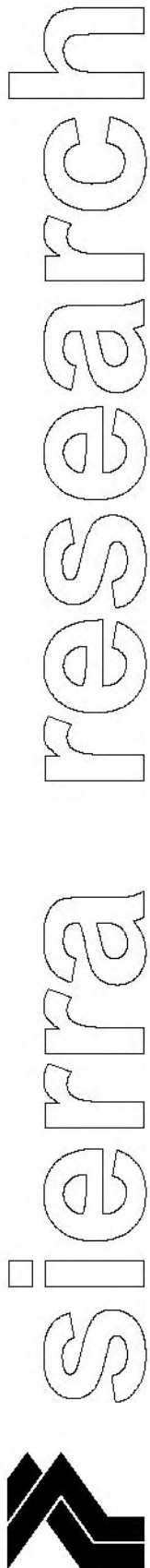
prepared for:

**Arizona Department of Environmental Quality**

January 24, 2005

prepared by:

Sierra Research, Inc.  
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Report No. SR2005-01-01

Impacts of Eliminating Maricopa County Wintertime Gasoline Standards  
on Emissions and Ambient Concentrations of CO in February and March

Prepared for

Arizona Department of Environmental Quality

January 24, 2005

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Report No. SR2005-01-01

## Impacts of Eliminating Maricopa County Wintertime Gasoline Standards on Emissions and Ambient Concentrations of CO in February and March

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## 1. EXECUTIVE SUMMARY

As part of efforts to control wintertime carbon monoxide (CO) emissions in the Phoenix metropolitan area, specific requirements for gasoline sold between October and March of each year have been put in place. Current wintertime gasoline requirements include:

- A minimum oxygen content of 3.5% (by weight);
- A maximum Reid vapor pressure (RVP) of 9.0 psi; and
- Compliance with the California Air Resources Board's (CARB's) Phase 2 gasoline regulations (which place a limit on sulfur content that is more stringent than current federal requirements).

Because of the implementation of more stringent emissions standards on new vehicles, operation of an aggressive inspection and maintenance program, and the fuel standards noted above, ambient levels of CO in the Phoenix metropolitan area have declined dramatically since 1990. In fact, the last violation of the National Ambient Air Quality Standard (NAAQS) for CO occurred in 1996, and the maximum 8-hour concentration recorded in 2003 (the last year for which complete data are available) was more than 30% below the 9 ppm NAAQS.

In the last 15 years, the highest CO levels measured in the Phoenix metropolitan area have occurred in November, December, and January. During that time period, no violations of the CO NAAQS were recorded in February and March, and the maximum 8-hour concentrations recorded for these months in 2004 were 60% below the standard. Because of logistical problems associated with the change-over from wintertime to summertime gasoline that currently occurs in April and ambient CO levels that are well below the NAAQS during February and March, the Arizona legislature has authorized elimination of the wintertime oxygenate, RVP, and CARB Phase 2 requirements for the months of February and March, pending a demonstration by the Arizona Department of Environmental Quality (ADEQ) that the CO NAAQS would be protected and that the U.S. Environmental Protection Agency (EPA) would approve this change to the Cleaner Burning Gasoline (CBG) program.

This report presents the results of a number of analyses conducted by Sierra Research, Inc. (Sierra) under contract to ADEQ that investigated the emissions and air quality impacts of relaxing current wintertime gasoline standards in the Phoenix metropolitan area during the months of February and March. Specifically, the following analyses were performed:



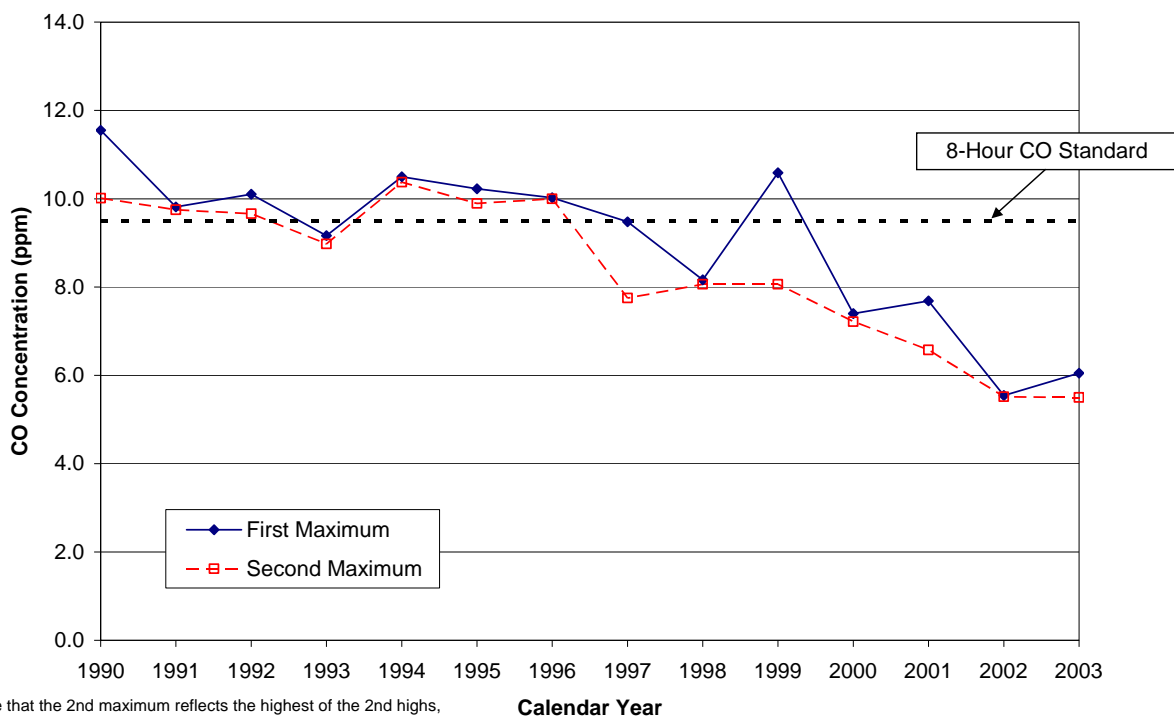
- An evaluation of ambient CO concentrations from 1990 through March 2004, which included summarizing maximum and second-high CO concentrations by monitor and analyzing trends for the months of February and March;
- An assessment of the emissions impact of the relaxation of wintertime gasoline specifications for 2005, 2010, and 2015 using EPA's MOBILE6.2 emission factors; and
- A "roll-forward" assessment of estimated CO concentrations for February and March 2005, 2006, 2010, and 2015 that are expected to occur as a result of relaxing the wintertime gasoline specifications in these months.

The results of these analyses are summarized below.

### Evaluation of Ambient CO Concentrations

Figure ES-1 summarizes the first and second maximum 8-hour CO concentrations observed in Maricopa County between 1990 and 2003. As observed in that figure, Maricopa County last violated the NAAQS for CO, which is based on the second-highest concentration observed in a year, in 1996, and there has been a continuing downward trend in ambient CO levels for the past 10 years. The last time a reading was recorded above the standard level was in 1999.

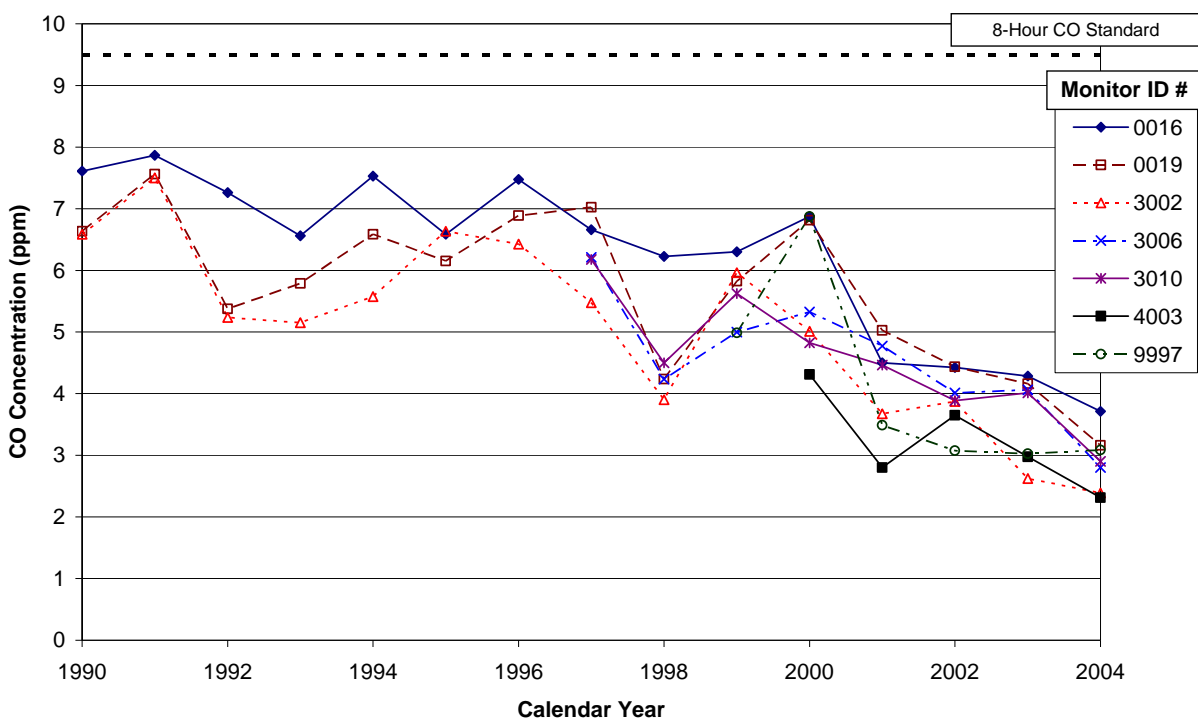
**Figure ES-1**  
**1st and 2nd Maximum 8-Hour CO Levels in Maricopa County, Arizona\***  
**(Based on October to March Data)**



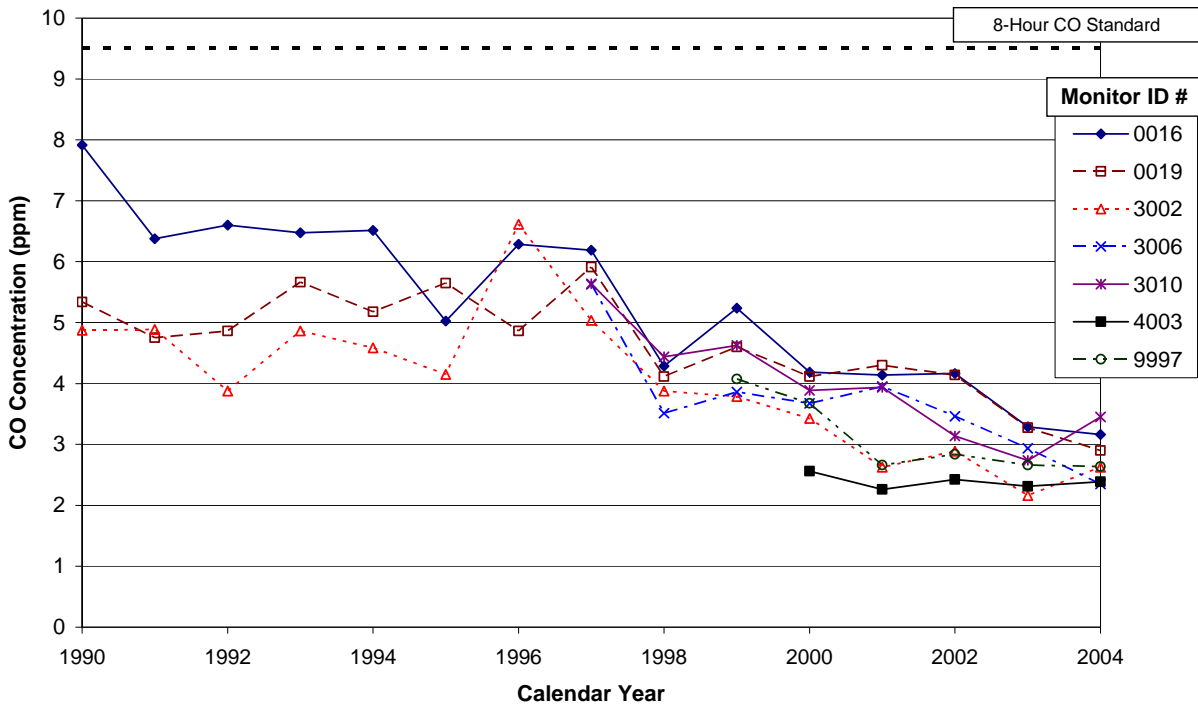
As noted above, this study was particularly focused on CO concentrations observed in February and March because that is the time period during which changes in gasoline standards may be made. Figures ES-2 and ES-3 show trends in the maximum 8-hour ambient CO concentrations observed in February and March, respectively, between 1990 and 2004. (Note that the second-high 8-hour concentrations, which is the basis for compliance with the NAAQS, are shown in the body of this report.) These results are presented for the seven monitoring sites with the highest recorded CO concentrations for these months. Consistent with Figure ES-1 (which presented the maxima observed over the entire year), Figures ES-2 and ES-3 show that CO concentrations have been declining over the past eight to ten years during the months of February and March. In addition, the most recent data show that the maximum 8-hour CO values recorded in February and March are more than 60% below the ambient standard. Thus, it appears that significant increases in CO emissions could occur as a result of the relaxation of gasoline standards without compromising the area's ability to comply with the federal CO standard.

**Figure ES-2**

**February First Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Highest Monitoring Sites in Maricopa County**



**Figure ES-3**  
**March First Maximum 8-Hour Ambient CO Levels by Monitor**  
**Based on the Seven Highest Monitoring Sites in Maricopa County**



Based on the analysis of ambient CO data, only two monitors currently in operation in Maricopa County have recorded exceedances of the 8-hour CO standard (i.e., second-high CO concentrations equal to or greater than 9.5 ppm) since 1990:

- Monitor #0016 - West Indian School Road Station; and
- Monitor #0019 - West Phoenix Station.

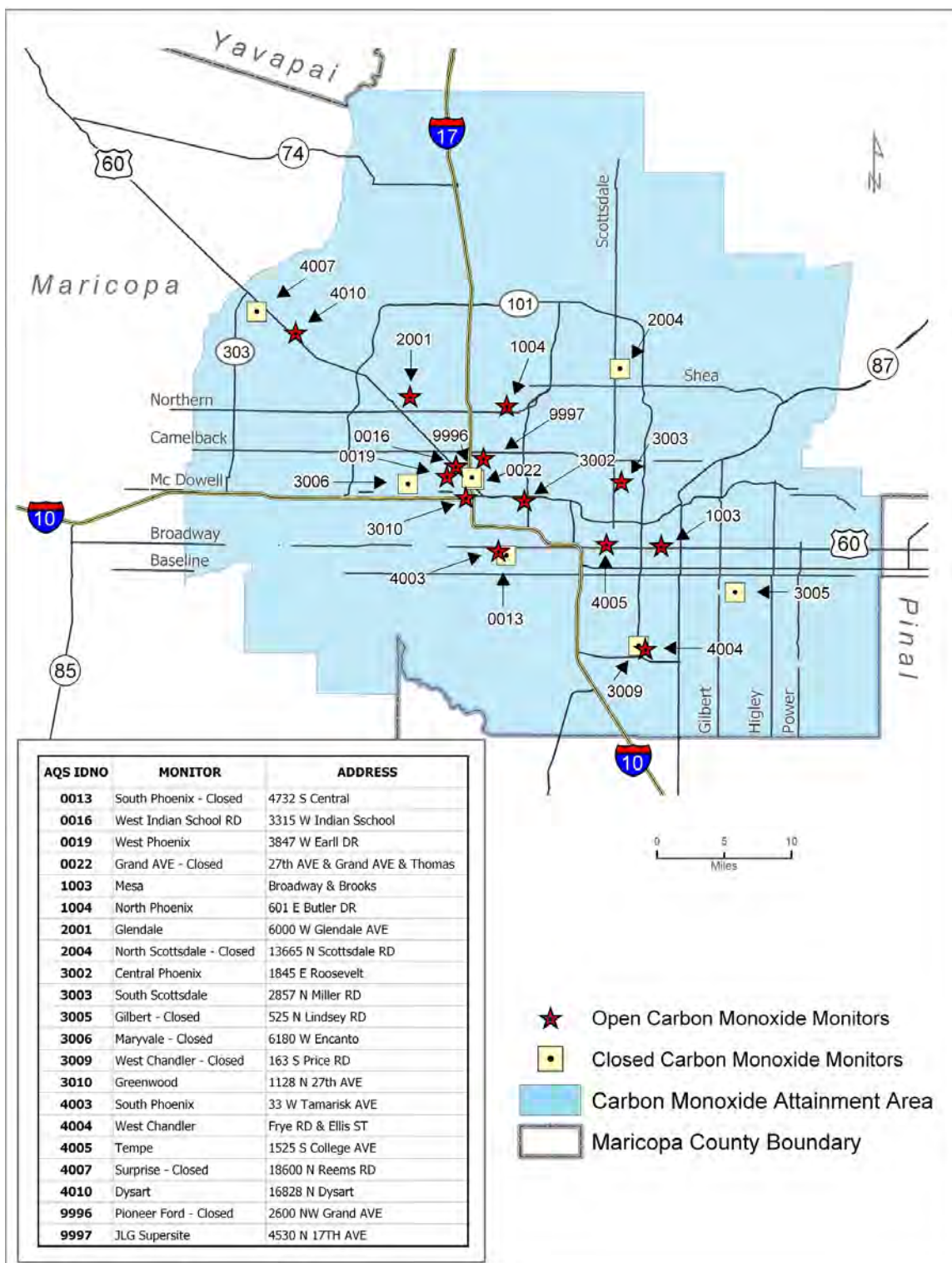
These monitors continue to record the highest CO levels in the Phoenix metropolitan area. Another monitor currently in operation that records ambient CO concentrations in the same range as Monitors 0016 and 0019 is:

- Monitor #3010 - Greenwood Station.

Thus, these three locations were targeted for a more detailed analysis of CO trends and travel forecasts in the vicinity of the monitors.

Figure ES-4 shows the geographic location of all carbon monoxide monitoring sites in Maricopa County. The three monitors outlined above are all in the vicinity of the Interstate-10/Interstate-17 interchange, and a more detailed map of their locations is presented in Figure ES-5.

**Figure ES-4**  
**Carbon Monoxide Monitoring Sites in Maricopa County**



**Figure ES-5**  
**Detailed Locations of the Three Monitoring Sites Recording the**  
**Highest CO Concentrations in Maricopa County**



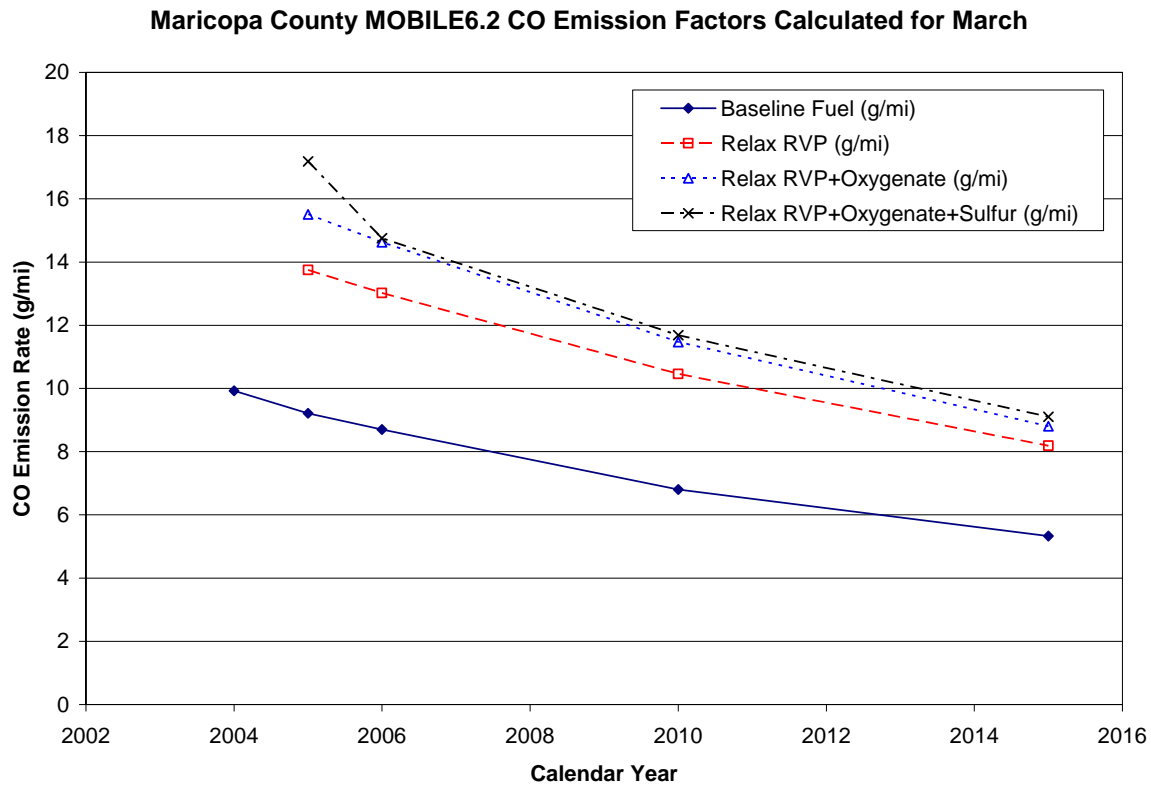
### Impacts of Fuel Specification Changes on Motor Vehicle CO Emissions

As requested in the Scope of Work for this project, the latest MOBILE6 inputs developed by the Maricopa Association of Governments (MAG) for the May 2003 Carbon Monoxide Redesignation Request and Maintenance Plan were also used in this effort. Changes to ambient temperature were made to reflect February and March conditions, and the fuel specification changes were modeled as follows:

- Relaxed RVP to ASTM standards for February and March;
- Removal of oxygenate requirements; and
- Relaxation of sulfur levels to federal Tier 2 requirements.

The impacts of these changes on CO emission rates calculated with MOBILE6 for the month of March are illustrated in Figure ES-6, which also shows the incremental impacts of the various modifications. The March results are presented here, as the impacts of the fuel changes were more pronounced for March than for February. The February results are tabulated in the body of this report.

Figure ES-6



As seen in Figure ES-6, relaxing the RVP requirement has the greatest impact on CO emissions from on-road vehicles. However, it should be noted that the basis of these impacts in MOBILE6 is quite dated, and likely overstates the RVP effect on late-model vehicles.\* Thus, these estimates reflect a worst-case scenario.

### Results of the “Roll-Forward” Analysis

Using the emission factors described above in conjunction with estimates of vehicle miles traveled (VMT), motor vehicle CO emissions inventories were developed for 2004, 2005, 2010, and 2015 for February and March. CO emissions estimates for other source categories (i.e., point, area, and nonroad sources) were obtained from the 2003 MAG Maintenance Plan. The emission inventory estimates, along with 2004 ambient concentration data, were used in a “roll-forward” analysis to predict how changes to fuel specifications would impact 8-hour maximum CO concentrations observed in February and March. The results of this evaluation, which can be considered a “regional” analysis,

\* The MOBILE6 RVP corrections are based on testing of mid-1980s and older vehicles, which showed that CO emissions increased as the fuel volatility increased. This effect is primarily a result of increased hydrocarbon vapors stored in the evaporative canister, which are then “purged” with fresh air and burned in the engine. On older vehicles, this created a rich mixture that resulted in an increase in CO emissions. However, significant improvements have been made in vehicle purge strategies over the past 10 years, and the test data upon which the MOBILE6 corrections are based do not include vehicles with this technology.

are summarized in Table ES-1. That table shows that although CO concentrations are predicted to increase by up to 70%, the maximum estimated value (5.7 ppm) is well below the 8-hour standard of 9 ppm.

<b>Table ES-1</b> <b>Estimated Maximum 8-Hour CO Concentrations</b> <b>Based on a Roll-Forward Analysis with All Emission Sources</b> <b>(Regional Scale)</b>					
Month	Fuel Scenario	Estimated Concentration by Calendar Year (ppm)			
		2004	2005	2010	2015
February	Baseline	3.7	3.6	3.3	3.1
	Relaxed		5.4	4.5	4.2
March	Baseline	3.5	3.4	3.0	2.8
	Relaxed		5.7	4.7	4.3

Because CO is typically a very localized pollutant, and because the primary source of CO in urban areas is on-highway motor vehicles, a second set of roll-forward calculations was generated in which it was assumed that on-highway motor vehicles were the only source of CO at the monitoring sites recording the highest CO levels in the Phoenix metropolitan area. This is more reflective of a “site-specific” analysis, and it reflects a worst-case scenario, as relaxation of gasoline specifications has the largest impact on on-highway vehicles.

The results of this analysis are shown graphically in Figure ES-7 for February and in Figure ES-8 for March. Each figure shows the results for relaxing the fuel specifications in February 2005 as well as February 2006. Under the latter scenario, the impact is not as great because fleet emissions as a whole are reduced between 2005 and 2006, and the federal Tier 2 sulfur regulations (which would be effective under the relaxed fuel specification scenarios) are one year closer to full implementation. Figures ES-7 and ES-8 both show that the estimated increases in maximum 8-hour ambient CO concentrations, which were forecast from the maximum levels recorded in February and March of 2004, are not enough to cause a violation of the standard.



Figure ES-7

**Estimated Worst-Case Impacts of Relaxing Gasoline Specifications on February Maximum 8-Hour CO Concentrations in Maricopa County**  
**(Based on MOBILE6 Predictions Assuming All CO is from On-Highway Vehicles)**

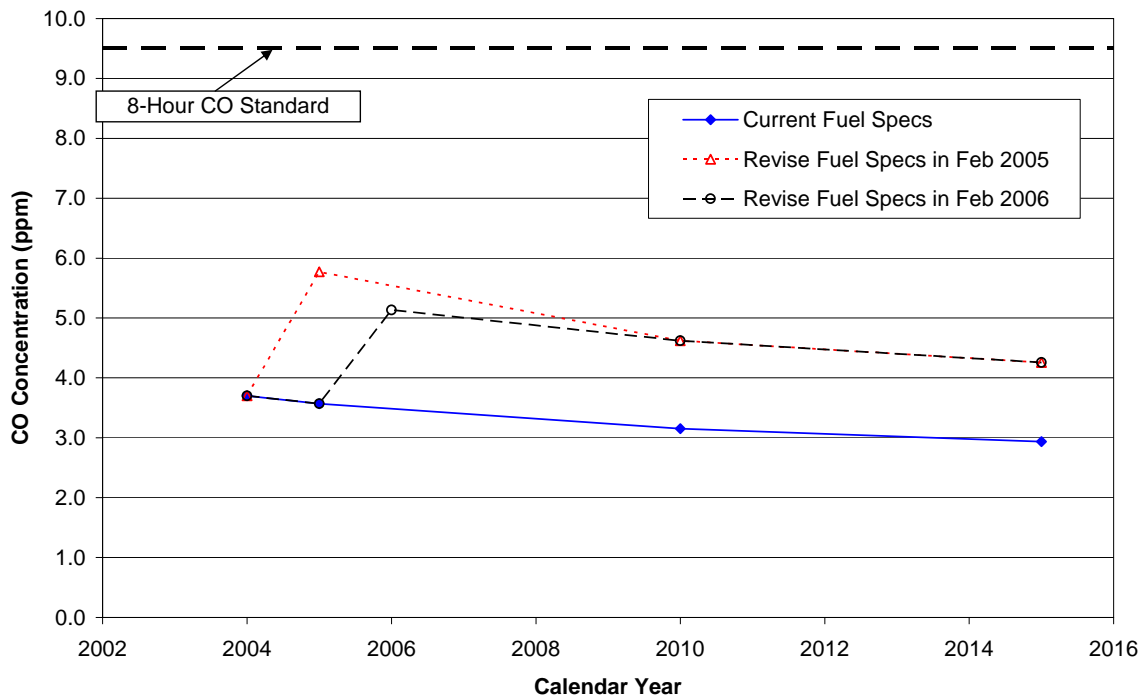
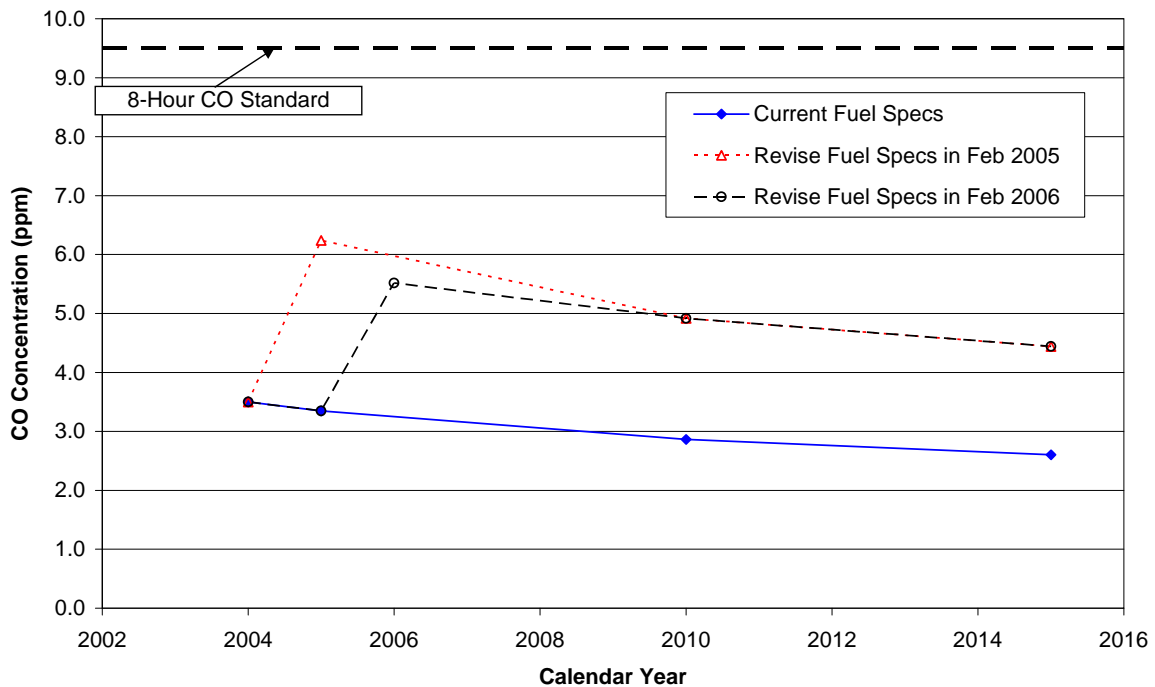


Figure ES-8

**Estimated Worst-Case Impacts of Relaxing Gasoline Specifications on March Maximum 8-Hour CO Concentrations in Maricopa County**  
**(Based on MOBILE6 Predictions Assuming All CO is from On-Highway Vehicles)**





A final analysis performed for this study was an evaluation of the impact that higher-than-average VMT growth rates might have on estimated CO concentrations. As noted above, CO is a localized pollutant, and if VMT growth near a monitoring site is higher than for the area as a whole, the impact of fuel specification changes on CO concentrations at that site would be expected to be greater.

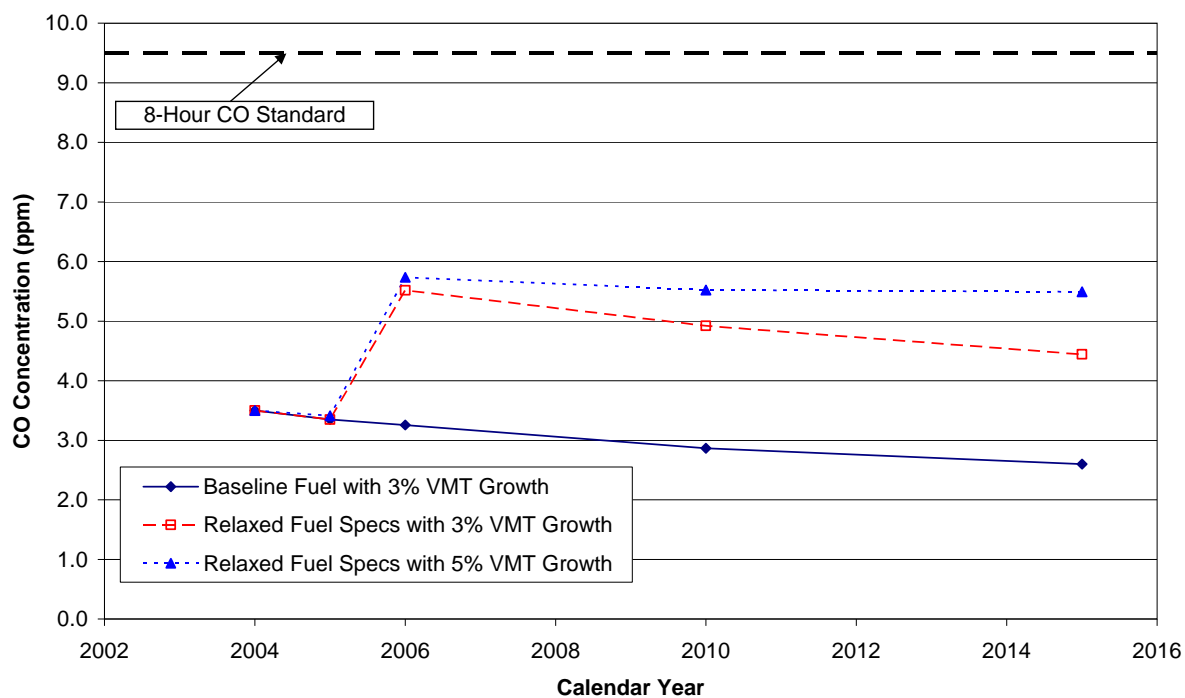
For this analysis, two annual VMT growth rates were investigated: 3% (approximately the current areawide VMT growth) and 5%. To put these numbers in perspective, a 3% annual growth rate reflects a 38% increase in travel between the 2004 base year and 2015, and a 5% growth rate reflects a 71% increase in travel between 2004 and 2015.

The results of this analysis for the month of March are presented in Figure ES-9. March was selected for this evaluation because the impacts of gasoline specification changes had a greater impact on CO emissions and projected CO concentrations in the March analysis than in the February analysis. In addition, this figure assumes that the gasoline specification changes would go into effect in 2006. As observed in the figure, even with a 5% annual VMT growth rate, relaxation of the Maricopa County gasoline specifications in February and March is not expected to result in an exceedance of the ambient CO standard.

It is worth noting that areas in the vicinity of the three monitors outlined above that have recorded the highest CO levels in the Phoenix metropolitan area in the last several years are projected to have annual VMT growth rates between 2006 and 2015 that are well below the regional average of 3% per year. Thus, higher-than-average VMT growth is not expected to be an issue with respect to the impacts of motor vehicle emissions on ambient CO levels recorded at these locations. This result is not unexpected, as those monitors are located in developed urban areas where adjacent streets and freeways are already operating at or near capacity.

**Figure ES-9**

**Impacts of Relaxing Gasoline Specifications on March Maximum 8-Hour CO Concentrations in Maricopa County at Varying VMT Growth Rates**  
(Based on MOBILE6 Predictions Assuming All CO is from On-Highway Vehicles)



## 2. INTRODUCTION

### Background

Carbon monoxide (CO) is a colorless, odorless gas that results from the incomplete combustion of hydrocarbon fuels and inhibits the blood's ability to carry oxygen from the lungs to the body. On-road and off-road gasoline-powered vehicles are generally the largest sources of CO emissions in urban areas. Additionally, the highest ambient CO levels are typically observed in the winter months when colder temperatures lead to higher CO emissions from automobiles and stagnant meteorological conditions limit the dilution and dispersion of CO.

As part of efforts to control wintertime CO emissions in the Phoenix metropolitan area, specific requirements for gasoline sold between October and March of each year have been put in place. Current wintertime gasoline requirements include:

- A minimum oxygen content of 3.5% (by weight);
- A maximum Reid vapor pressure (RVP) of 9.0 psi; and
- Compliance with the California Air Resources Board's (CARB's) Phase 2 gasoline regulations (which place a limit on sulfur content that is more stringent than current federal requirements).

Because of the implementation of more stringent emissions standards on new vehicles, operation of an aggressive inspection and maintenance program, and the fuel standards noted above, ambient levels of CO in the Phoenix metropolitan area have declined dramatically since 1990. In fact, the last violation of the National Ambient Air Quality Standard (NAAQS) for CO occurred in 1996, and the maximum 8-hour concentration recorded in 2003 (the last year for which complete data are available) was more than 30% below the 9 ppm NAAQS.

In the last 15 years, the highest CO levels measured in the Phoenix metropolitan area have occurred in November, December, and January. During that time period, no violations of the CO NAAQS have been recorded in February and March, and the maximum 8-hour concentrations recorded for these months in 2004 were 60% below the standard. Because of logistical problems associated with the change-over from wintertime to summertime gasoline that currently occurs in April and ambient CO levels that are well below the NAAQS during February and March, the Arizona legislature has authorized elimination of the wintertime oxygenate, RVP, and CARB Phase 2 requirements for the months of February and March, pending a demonstration by the Arizona Department of Environmental Quality (ADEQ) that the CO NAAQS would be

protected and that the U.S. Environmental Protection Agency (EPA) would approve this change to the Cleaner Burning Gasoline (CBG) program.

This report presents the results of a number of analyses conducted by Sierra Research, Inc. (Sierra) under contract to ADEQ that investigated the emissions and air quality impacts of relaxing current wintertime gasoline standards in the Phoenix metropolitan area during the months of February and March. Specifically, the following analyses were performed:

- An evaluation of ambient CO concentrations from 1990 through March 2004, which included summarizing maximum and second-high CO concentrations by monitor and the analysis of trends for the months of February and March;
- An assessment of the emissions impact of the relaxation of wintertime gasoline specifications for 2005, 2010, and 2015 using EPA’s MOBILE6.2 emission factors model in conjunction with inputs used by the Maricopa Association of Governments (MAG) to develop the emissions inventory for the “Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area”;<sup>1\*</sup> and
- A “roll-forward” assessment of estimated CO concentrations for February and March 2005, 2010, and 2015 that are expected to occur as a result of relaxing the wintertime gasoline specifications in these months. A roll-forward analysis, which was conducted in lieu of more detailed grid-based simulation modeling, assumes that changes in ambient CO concentrations are directly proportional to changes in CO emissions.

### Structure of the Report

Following this introduction, Section 3 presents the results of Sierra’s analysis of ambient CO data. Although some statistics are reported for the 1-hour CO standard, the focus of this analysis was on the 8-hour CO standard, as that is the more restrictive of the two. Section 4 presents the results of Sierra’s analysis of the impacts that the relaxation of wintertime gasoline standards would have on the CO emissions inventory. The focus of this analysis was on inventory estimates specific to February and March. Section 5 summarizes the results of the “roll-forward” analysis, which again focused on the months of February and March, and Section 6 lists the references cited in the report. Appendix A contains sample MOBILE6 input files.

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\* Superscripts denote references listed in Section 6.

### 3. ANALYSIS OF AMBIENT CARBON MONOXIDE DATA

This section of the report presents Sierra's analysis of ambient CO data collected in the Phoenix metropolitan area (i.e., the urbanized area of Maricopa County) between 1990 and 2004. When reviewing ambient CO concentrations, two federal standards are applicable:

- 35 parts per million (ppm) averaged over one hour; and
- 9 ppm averaged over eight hours.

To comply with the National Ambient Air Quality Standards (NAAQS) for CO, no monitoring site may exceed the standard more than once a year. Thus, the analysis of ambient CO data often involves investigating “second-high” or “second-maximum” concentrations in addition to maximum values. Because of the rounding convention used by EPA, a concentration of 9.5 ppm is needed to violate the 8-hour standard, and a concentration of 35.5 ppm is needed to violate the 1-hour standard. In practice, the 8-hour standard is the more stringent of the two, and therefore this section generally focuses on 8-hour average concentrations, although some results are also presented for 1-hour concentrations.

#### Data Description and Analysis

For this analysis, hourly CO data for 1994 through 2003 were obtained from EPA's Air Quality System (AQS) web site.<sup>2</sup> Data for 1989 through 1993 were obtained through a request to EPA,<sup>3</sup> and data for the first part of 2004 were provided by ADEQ staff.<sup>4</sup> As described more fully below, statistics summarizing ambient CO levels were prepared for 1990 through March of 2004; the 1989 data were needed to calculate the 8-hour average concentrations for the first seven hours of 1990. Because monthly results were evaluated in this study, it was necessary to process hourly CO data rather than obtain results directly from EPA's AirData web site (which lists annual maxima by monitor). This was done using a SAS routine developed for this effort following the procedures and guidelines published by EPA.<sup>5,6</sup>

As outlined in the Scope of Work for this project and in discussions with ADEQ staff, the following statistics were generated:

- Maximum 1-hour concentrations;
- Second-high 1-hour concentrations;

- Maximum 8-hour concentrations; and
- Second-high 8-hour concentrations.

The above statistics were developed by month (October through March) for each monitor in Maricopa County and for the area as a whole. Annual maxima (based on the October to March timeframe) were also developed. As noted above, most of the focus in this analysis was on the 8-hour standard, as that is the standard that typically is of concern with respect to compliance with the NAAQS for CO.

### Annual Results

Annual results (based on data from October through March, which generally encompasses periods of highest CO levels) are presented in the following tables and figures. Those results are briefly summarized below.

- Table 1: Maximum 1-hour CO concentrations by monitor and overall maximum 1-hour concentration for calendar years 1990 to 2003 are summarized in Table 1. During this time period, the highest recorded value was 23.2 ppm in 1992 (30% below the 35 ppm standard), and the maximum value recorded in 2003 was 7.5 ppm (almost 80% below the standard).
- Table 2: Second maximum 1-hour CO concentrations by monitor and the overall second maximum 1-hour concentration for calendar years 1990 to 2003 are summarized in Table 2. The highest second maximum during this period was measured in 1991 at 15.1 ppm, less than half the standard.
- Figure 1: First maximum and second maximum 1-hour CO concentrations are shown graphically in this figure. This figure shows that the 1-hour CO standard was not approached during the 1990 to 2004 timeframe and that 1-hour maximum CO concentrations have dropped by over 50% since the early 1990s.
- Table 3: This table summarizes maximum 8-hour concentrations observed at monitors in Maricopa County between 1990 and 2004.
- Table 4: This table summarizes the second maximum 8-hour concentrations observed at monitors in Maricopa County between 1990 and 2004. Note that the second maximum values reflect the highest of the second highs observed in the monitoring network, consistent with the methodology used to establish a design value for an area.
- Figure 2: First maximum and second maximum 8-hour CO concentrations are shown graphically in this figure. This figure shows that the 8-hour CO standard was last exceeded (i.e., the second maximum 8-hour concentration was above the standard) in 1996, and that concentrations have continued to decline since that time.

**Table 1**  
**Annual 1<sup>st</sup> Maximum 1-Hour CO Concentrations in Maricopa County, Arizona**  
**(Based on October to March Data)**

Monitor	Location	1st Maximum 1-Hour CO Concentration (ppm)													
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0013	4732 S Central Ave-South Phoenix Station	9.5	10.0	9.9	7.7	9.2	9.5	10.9	7.3	8.2	7.8	---	---	---	---
0016	3315 W Indian School Rd, Phoenix	12.8	16.1	13.5	11.7	13.2	11.8	12.6	10.8	9.7	11.8	11.9	8.0	7.7	6.8
0019	3847 W Earll Dr-West Phoenix Station	10.9	12.4	13.7	10.4	13.6	11.2	11.7	11.7	10.7	12.3	10.6	8.4	8.6	7.5
0022	27th Ave/Grand Ave/Thomas Rd,Phoenix	---	---	---	---	---	13.2	15.1	12.6	10.7	18.4	10.5	10.3	7.7	---
1003	Broadway & Brooks, Mesa	3.4	7.3	8.6	6.7	8.8	8.5	6.7	7.5	6.5	7.2	6.0	4.6	4.9	3.5
1004	601 E Butler Dr & N 6th St,Phoenix	11.6	10.6	9.6	9.3	9.0	9.1	7.7	8.7	8.0	7.8	6.0	5.2	4.5	4.0
2001	6000 W Olive Ave,Glendale	8.4	6.9	8.6	6.8	7.5	6.4	8.2	5.4	5.0	5.7	4.6	4.7	4.1	5.7
2004	13665 N Scottsdale Rd, Scottsdale	5.9	6.8	6.6	6.9	7.5	---	---	---	---	---	---	---	---	---
3002	1845 E Roosevelt St-Central Phoenix Stn	13.2	10.7	11.5	10.1	12.9	12.0	11.1	9.4	9.1	11.3	8.1	6.0	6.0	5.9
3003	2857 N Miller Rd-S Scottsdale Stn	11.9	10.3	9.5	9.4	9.0	8.5	8.0	6.3	5.5	6.0	5.0	4.5	5.5	4.1
3005	525 N Lindsey Rd-Gilbert Station	---	---	---	---	---	---	---	3.7	3.5	3.8	3.7	---	---	---
3006	6180 W Encanto Blvd-Maryvale Station	---	---	---	---	---	---	---	8.3	7.5	9.7	9.3	9.0	8.0	5.8
3009	163 S Price Rd-West Chandler Station	---	---	---	---	---	---	---	3.8	4.1	4.3	5.7	---	---	---
3010	1128 N. 27th Ave-Greenwood Station	---	---	---	---	---	---	---	9.7	9.4	10.8	8.1	7.0	7.3	6.8
4003	33 W Tamarisk Ave, Phoenix	---	---	---	---	---	---	---	---	---	7.4	10.0	6.8	6.5	5.8
4004	Ellis & Frye Rd, Chandler	---	---	---	---	---	---	---	---	---	---	3.8	3.3	3.5	3.9
4005	1525 S College Ave, Tempe	---	---	---	---	---	---	---	---	---	---	5.0	4.3	4.9	3.8
4007	18600 N. Reems Road	---	---	---	---	---	---	---	---	---	---	---	2.6	4.2	3.6
4010	16825 N. Dysart	---	---	---	---	---	---	---	---	---	---	---	---	---	1.8
9996	2600 NW Grand Avenue	---	---	23.2	16.3	---	---	---	---	---	---	---	---	---	---
9997	4530 N 17th Avenue	---	---	---	---	---	---	---	---	---	8.5	9.1	7.0	5.7	6.7
Maximum 1st Max 1-Hour Concentration		13.2	16.1	23.2	16.3	13.6	13.2	15.1	12.6	10.7	18.4	11.9	10.3	8.6	7.5

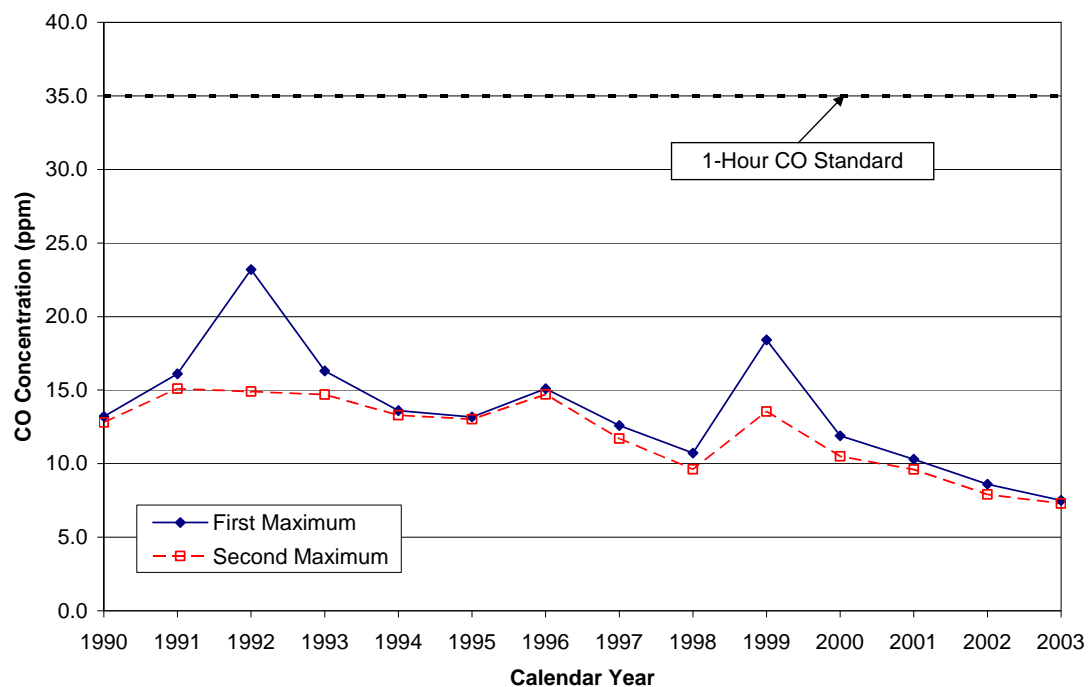
**Table 2**  
**Annual 2<sup>nd</sup> Maximum 1-Hour CO Concentrations in Maricopa County, Arizona**  
**(Based on October to March Data)**

Monitor	Location	2st Maximum 1-Hour CO Concentration (ppm)													
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0013	4732 S Central Ave-South Phoenix Station	8.5	8.4	8.4	7.7	9.0	8.5	10.3	7.2	7.9	7.7	---	---	---	---
0016	3315 W Indian School Rd, Phoenix	12.8	15.1	12.5	11.5	13.1	11.6	11.8	10.3	9.4	11.7	9.6	7.7	7.3	6.8
0019	3847 W Earll Dr-West Phoenix Station	10.9	11.4	12.6	10.3	13.3	11.2	11.2	10.3	9.6	11.9	10.4	8.2	7.9	7.3
0022	27th Ave/Grand Ave/Thomas Rd,Phoenix	---	---	---	---	---	13.0	14.7	11.7	9.6	13.5	10.5	9.6	7.5	---
1003	Broadway & Brooks, Mesa	3.3	6.1	8.5	6.0	8.7	8.1	6.3	7.0	6.1	6.5	5.7	3.8	4.8	3.4
1004	601 E Butler Dr & N 6th St,Phoenix	11.3	10.4	9.5	8.7	8.8	7.5	7.5	7.5	7.3	6.4	5.9	4.7	4.5	4.0
2001	6000 W Olive Ave,Glendale	7.7	6.5	8.0	6.1	7.4	6.2	6.9	5.2	4.9	5.3	4.6	4.7	3.9	3.5
2004	13665 N Scottsdale Rd, Scottsdale	5.9	6.0	5.5	6.3	6.5	---	---	---	---	---	---	---	---	---
3002	1845 E Roosevelt St-Central Phoenix Stn	12.7	10.5	10.3	9.8	11.8	11.5	10.3	9.0	8.9	9.3	8.0	5.8	5.8	5.4
3003	2857 N Miller Rd-S Scottsdale Stn	10.8	9.5	8.7	9.3	8.8	8.3	7.0	6.1	5.2	5.8	4.9	4.4	4.3	4.0
3005	525 N Lindsey Rd-Gilbert Station	---	---	---	---	---	---	---	3.2	3.3	3.7	3.4	---	---	---
3006	6180 W Encanto Blvd-Maryvale Station	---	---	---	---	---	---	---	8.3	7.5	9.0	9.1	8.2	6.9	5.7
3009	163 S Price Rd-West Chandler Station	---	---	---	---	---	---	---	3.6	4.0	4.0	4.0	---	---	---
3010	1128 N. 27th Ave-Greenwood Station	---	---	---	---	---	---	---	8.9	8.9	9.5	8.1	6.9	6.8	6.8
4003	33 W Tamarisk Ave, Phoenix	---	---	---	---	---	---	---	---	---	7.4	8.4	6.3	6.5	5.5
4004	Ellis & Frye Rd, Chandler	---	---	---	---	---	---	---	---	---	---	3.4	3.3	3.2	3.3
4005	1525 S College Ave, Tempe	---	---	---	---	---	---	---	---	---	---	4.6	4.2	4.7	3.7
4007	18600 N. Reems Road	---	---	---	---	---	---	---	---	---	---	---	2.5	2.4	1.8
4010	16825 N. Dysart	---	---	---	---	---	---	---	---	---	---	---	---	---	1.6
9996	2600 NW Grand Avenue	---	---	14.9	14.7	---	---	---	---	---	---	---	---	---	---
9997	4530 N 17th Avenue	---	---	---	---	---	---	---	---	---	8.2	7.9	6.9	5.4	6.0
Maximum 2st Max 1-Hour Concentration		12.8	15.1	14.9	14.7	13.3	13.0	14.7	11.7	9.6	13.5	10.5	9.6	7.9	7.3



**Figure 1**

**1st and 2nd Maximum 1-Hour CO Levels in Maricopa County, Arizona\***  
(Based on October to March Data)



\* Note that the 2nd maximum reflects the highest of the 2nd highs, consistent with establishment of a design value for an area.

**Table 3**  
**Annual 1<sup>st</sup> Maximum 8-Hour CO Concentrations in Maricopa County, Arizona**  
**(Based on October to March Data)**

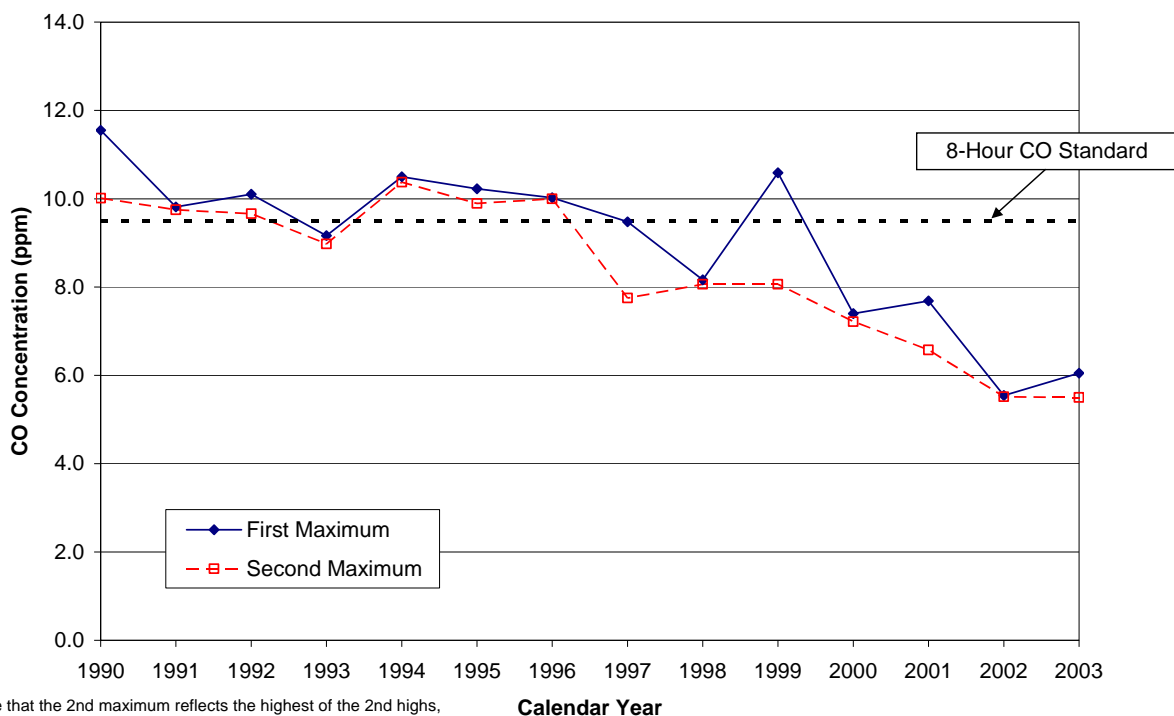
Monitor	Location	1st Maximum 8-Hour CO Concentration (ppm)													
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0013	4732 S Central Ave-South Phoenix Station	5.4	5.6	5.2	4.7	6.7	5.9	5.2	4.5	5.4	4.5	---	---	---	---
0016	3315 W Indian School Rd, Phoenix	11.6	9.8	10.1	9.2	10.5	10.1	8.5	8.3	8.2	7.7	6.9	6.9	5.5	5.5
0019	3847 W Earll Dr-West Phoenix Station	9.1	8.2	9.3	8.2	10.0	8.8	8.5	7.2	7.8	7.7	7.4	7.5	5.5	6.1
0022	27th Ave/Grand Ave/Thomas Rd,Phoenix	---	---	---	---	---	10.2	10.0	9.5	7.3	10.6	6.0	6.6	5.5	---
1003	Broadway & Brooks, Mesa	2.6	4.5	6.5	4.0	5.3	5.7	4.5	4.7	4.4	4.5	4.4	2.9	3.5	2.5
1004	601 E Butler Dr & N 6th St,Phoenix	5.6	5.7	5.3	5.3	5.0	4.0	3.9	4.0	6.2	3.5	3.2	2.5	3.3	2.3
2001	6000 W Olive Ave,Glendale	5.0	4.9	4.2	4.7	4.8	3.8	4.2	4.0	3.4	3.9	3.6	3.1	3.2	2.4
2004	13665 N Scottsdale Rd, Scottsdale	3.0	3.8	2.8	3.5	3.3	---	---	---	---	---	---	---	---	---
3002	1845 E Roosevelt St-Central Phoenix Stn	9.5	9.2	8.7	7.7	9.7	9.1	8.4	7.2	7.2	7.2	5.3	4.8	4.4	4.4
3003	2857 N Miller Rd-S Scottsdale Stn	7.8	6.2	6.1	6.5	5.0	5.6	4.9	4.2	3.7	4.3	3.3	3.2	3.0	2.3
3005	525 N Lindsey Rd-Gilbert Station	---	---	---	---	---	---	---	2.3	2.8	2.5	2.0	---	---	---
3006	6180 W Encanto Blvd-Maryvale Station	---	---	---	---	---	---	---	6.6	6.1	7.4	7.1	7.7	5.0	4.2
3009	163 S Price Rd-West Chandler Station	---	---	---	---	---	---	---	2.7	3.0	3.0	2.4	---	---	---
3010	1128 N. 27th Ave-Greenwood Station	---	---	---	---	---	---	---	7.6	7.5	6.7	5.7	5.3	5.4	5.3
4003	33 W Tamarisk Ave, Phoenix	---	---	---	---	---	---	---	---	---	4.6	5.9	4.6	3.8	3.5
4004	Ellis & Frye Rd, Chandler	---	---	---	---	---	---	---	---	---	---	2.5	2.3	2.2	2.6
4005	1525 S College Ave, Tempe	---	---	---	---	---	---	---	---	---	---	3.8	3.3	3.4	2.9
4007	18600 N. Reems Road	---	---	---	---	---	---	---	---	---	---	---	1.2	1.2	1.2
4010	16825 N. Dysart	---	---	---	---	---	---	---	---	---	---	---	---	---	1.2
9996	2600 NW Grand Avenue	---	---	9.8	7.9	---	---	---	---	---	---	---	---	---	---
9997	4530 N 17th Avenue	---	---	---	---	---	---	---	---	---	7.0	6.9	5.7	4.2	4.8
Maximum 1st Max 8-Hour Concentration		11.6	9.8	10.1	9.2	10.5	10.2	10.0	9.5	8.2	10.6	7.4	7.7	5.5	6.1

**Table 4**  
**Annual 2<sup>nd</sup> Maximum 8-Hour CO Concentrations in Maricopa County, Arizona**  
**(Based on October to March Data)**

Monitor	Location	2nd Maximum 8-Hour CO Concentration (ppm)													
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0013	4732 S Central Ave-South Phoenix Station	5.3	5.4	4.9	4.5	4.9	5.2	5.1	4.4	4.7	4.1	---	---	---	---
0016	3315 W Indian School Rd, Phoenix	10.0	9.8	9.3	9.0	10.4	9.2	8.3	7.2	8.1	7.6	6.8	6.6	5.4	5.3
0019	3847 W Earll Dr-West Phoenix Station	8.6	7.6	9.2	8.0	9.6	8.4	8.2	7.0	7.1	7.5	7.2	6.6	5.5	5.5
0022	27th Ave/Grand Ave/Thomas Rd,Phoenix	---	---	---	---	---	9.9	10.0	7.8	6.8	8.1	6.0	6.5	5.5	---
1003	Broadway & Brooks, Mesa	2.5	4.2	5.4	3.9	4.9	5.0	3.8	4.5	3.7	4.0	3.2	2.7	3.5	2.2
1004	601 E Butler Dr & N 6th St,Phoenix	5.5	5.2	4.6	5.0	4.9	3.8	3.7	3.4	5.6	3.5	3.1	2.5	2.7	2.1
2001	6000 W Olive Ave,Glendale	4.8	4.1	4.0	4.0	4.0	3.7	3.7	3.0	3.4	3.5	3.2	2.8	2.7	2.3
2004	13665 N Scottsdale Rd, Scottsdale	2.9	3.1	2.7	3.3	3.1	---	---	---	---	---	---	---	---	---
3002	1845 E Roosevelt St-Central Phoenix Stn	8.8	8.2	8.2	7.3	7.8	8.8	7.5	7.2	6.3	6.0	5.2	4.3	4.1	3.8
3003	2857 N Miller Rd-S Scottsdale Stn	7.7	5.3	6.1	6.2	5.0	5.1	4.9	4.2	3.5	4.1	3.1	3.1	2.8	2.2
3005	525 N Lindsey Rd-Gilbert Station	---	---	---	---	---	---	---	2.2	2.7	2.4	2.0	---	---	---
3006	6180 W Encanto Blvd-Maryvale Station	---	---	---	---	---	---	---	6.3	5.9	6.7	7.0	5.3	5.0	4.2
3009	163 S Price Rd-West Chandler Station	---	---	---	---	---	---	---	2.6	2.7	2.8	2.3	---	---	---
3010	1128 N. 27th Ave-Greenwood Station	---	---	---	---	---	---	---	6.9	6.8	6.7	5.6	4.7	5.1	5.1
4003	33 W Tamarisk Ave, Phoenix	---	---	---	---	---	---	---	---	---	4.4	4.8	3.4	3.7	3.3
4004	Ellis & Frye Rd, Chandler	---	---	---	---	---	---	---	---	---	---	2.2	2.1	2.2	2.5
4005	1525 S College Ave, Tempe	---	---	---	---	---	---	---	---	---	---	3.2	3.1	3.4	2.4
4007	18600 N. Reems Road	---	---	---	---	---	---	---	---	---	---	---	1.1	1.2	0.8
4010	16825 N. Dysart	---	---	---	---	---	---	---	---	---	---	---	---	---	1.1
9996	2600 NW Grand Avenue	---	---	9.7	7.3	---	---	---	---	---	---	---	---	---	---
9997	4530 N 17th Avenue	---	---	---	---	---	---	---	---	---	6.5	6.5	5.7	4.2	4.2
Maximum 2nd Max 8-Hour Concentration		10.0	9.8	9.7	9.0	10.4	9.9	10.0	7.8	8.1	8.1	7.2	6.6	5.5	5.5

**Figure 2**

**1st and 2nd Maximum 8-Hour CO Levels in Maricopa County, Arizona\***  
(Based on October to March Data)



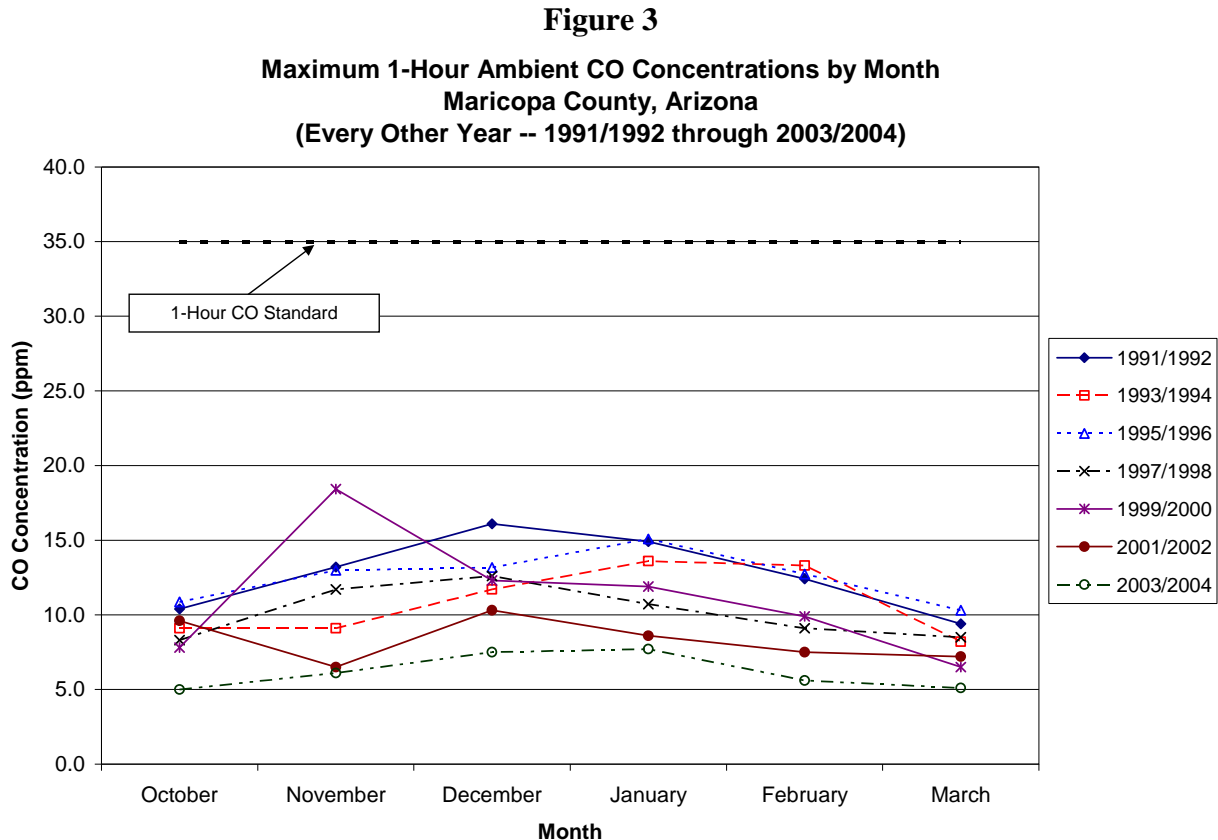
## Monthly Results

Of particular interest in this study are ambient CO concentrations by month. The next series of tables and graphs present maximum hourly, maximum 8-hour, and second maximum 8-hour CO concentrations for the months of October through March.

- Table 5: This table presents the maximum hourly CO levels by month for 1990 through March of 2004. The monitors where the maxima were observed are also presented in this table. These results show that the highest CO values are generally recorded in January and December.
- Figure 3: The maximum hourly CO levels presented in Table 5 are shown graphically in Figure 3. Because of the volume of data in Table 5, results are shown for every other year for winter 1991/1992 through winter 2003/2004. With few exceptions, maxima occur in December and January. In addition, maximum hourly CO concentrations dropped substantially since the early 1990s.

**Table 5**  
**Monthly 1<sup>st</sup> Maximum 1-Hour CO Concentrations in Maricopa County, Arizona**  
**(Based on October to March Data)**

Month	Max CO/ Monitor	1st Maximum 1-Hour CO Concentration (ppm)														
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
January	Max CO:	12.0	12.8	14.9	<b>16.3</b>	<b>13.6</b>	11.2	<b>15.1</b>	10.3	<b>10.7</b>	13.5	<b>11.9</b>	9.0	<b>8.6</b>	7.0	<b>7.7</b>
	Monitor:	0016	0016	9996	9996	0019	0019	0022	0022	0022	0022	0016	0022	0019	0019	0019
February	Max CO:	12.6	10.2	12.4	14.0	13.3	9.3	12.7	10.1	9.1	11.3	9.9	7.6	7.5	5.8	5.6
	Monitor:	0016	0019	9996	9996	0019	0022	0022	0016	0016	3002	0019	0019	0022	0016	0019
March	Max CO:	9.2	8.4	9.4	8.3	8.2	8.7	10.3	9.8	8.5	7.5	6.5	6.0	7.2	4.6	5.1
	Monitor:	0016	0016	9996	0016	0016	0022	0013	0016	3010	0022	0016	3006	0022	0016	0016
October	Max CO:	11.0	10.4	11.0	9.1	10.0	10.9	9.1	8.3	9.4	7.8	6.4	9.6	5.4	5.0	--
	Monitor:	0016	3002	9996	0016	0016	0022	0022	3010	0016	0016	3010	0022	0016	0019	--
November	Max CO:	12.8	13.2	<b>23.2</b>	9.1	9.8	13.0	12.0	11.7	9.7	<b>18.4</b>	9.6	6.5	6.8	6.1	--
	Monitor:	0016	0016	9996	3002	0019	0022	0022	0022	0016	0022	0019	0016	0019	0016	--
December	Max CO:	<b>13.2</b>	<b>16.1</b>	13.8	11.7	12.9	<b>13.2</b>	12.6	<b>12.6</b>	9.6	12.3	9.8	<b>10.3</b>	7.3	<b>7.5</b>	--
	Monitor:	3002	0016	9996	0016	3002	0022	0016	0022	0022	0019	0022	0022	0016	0019	--
Maximum 1-Hour CO		13.2	16.1	23.2	16.3	13.6	13.2	15.1	12.6	10.7	18.4	11.9	10.3	8.6	7.5	--
Month		Dec	Dec	Nov	Jan	Jan	Dec	Jan	Dec	Jan	Nov	Jan	Dec	Jan	Dec	--
Monitor		3002	0016	9996	9996	0019	0022	0022	0022	0022	0022	0016	0022	0019	0019	--



- Table 6: First maximum 8-hour CO concentrations by month are summarized in this table. Consistent with the 1-hour maxima, the highest 8-hour levels are observed in December and January.
- Table 7: Second maximum 8-hour CO concentrations by month are summarized in this table. Again, the highest levels are generally observed in December and January. More recently (i.e., the last four years), annual maxima have been recorded in January.
- Figure 4: The first maximum 8-hour CO results presented in Table 6 are shown graphically in Figure 4. Similar to the hourly CO results shown in Figure 3, these results indicate significant CO reductions since the early 1990s. In addition, the minimum values are generally observed in February and March of a given winter season. Because of the volume of data in Table 6, results are shown for every other year for winter 1991/1992 through winter 2003/2004.
- Figure 5: The second maximum 8-hour CO results presented in Table 7 are shown graphically in Figure 5. Again, maxima are generally observed in December and January, while minima are observed in February and March. Again, results are shown for every other year for winter 1991/1992 through winter 2003/2004.

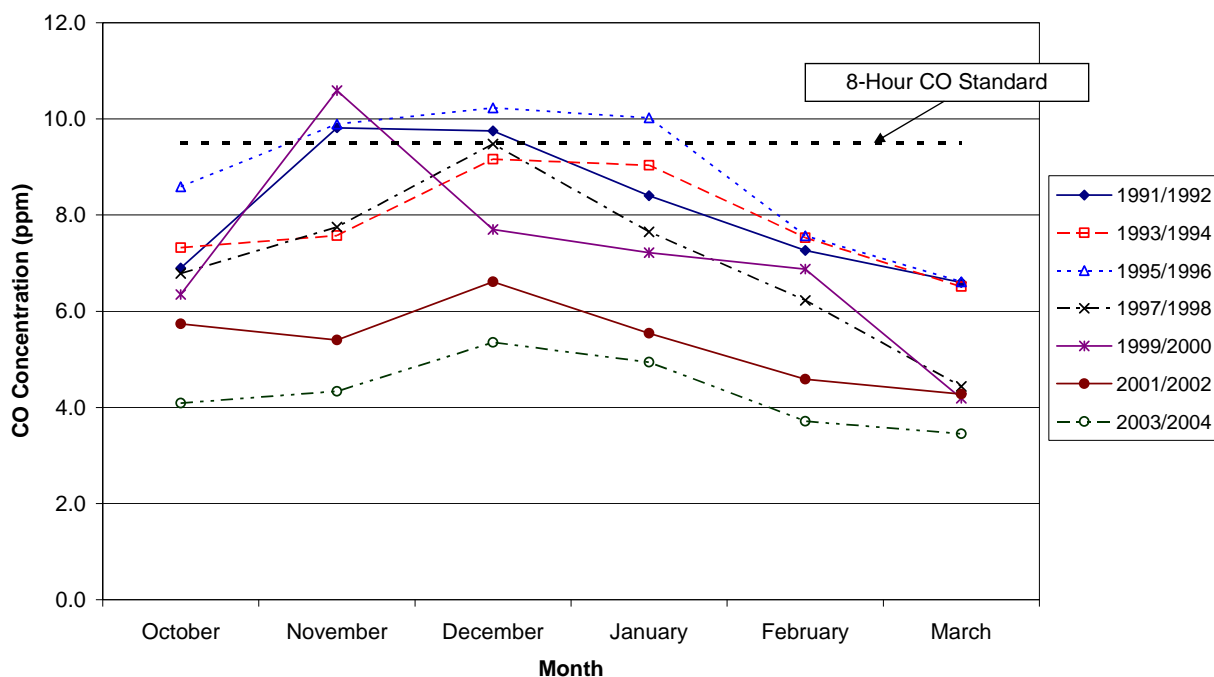
**Table 6**  
**Monthly 1<sup>st</sup> Maximum 8-Hour CO Concentrations in Maricopa County, Arizona**  
**(Based on October to March Data)**

Month	Max CO/ Monitor	1st Maximum 8-Hour CO Concentration (ppm)														
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
January	Max CO:	8.8	8.9	8.4	8.2	9.0	6.9	<b>10.0</b>	6.5	7.7	8.1	7.2	<b>7.7</b>	<b>5.5</b>	<b>6.1</b>	<b>4.9</b>
	Monitor:	0016	0016	9996	0016	0016	0016	0022	0019	0016	0022	0019	3006	0019	0019	3010
February	Max CO:	7.6	7.9	7.3	6.6	7.5	6.6	7.6	7.0	6.2	6.3	6.9	5.0	4.6	4.3	3.7
	Monitor:	0016	0016	0016	0016	0016	3002	0022	0019	0016	0016	0016	0019	0022	0016	0016
March	Max CO:	7.9	6.4	6.6	6.5	6.5	5.7	6.6	6.2	4.4	5.2	4.2	4.3	4.3	3.3	3.5
	Monitor:	0016	0016	0016	0016	0016	0019	3002	0016	3010	0016	0016	0019	0022	0016	3010
October	Max CO:	9.8	6.9	8.3	7.3	8.3	8.6	6.5	6.8	<b>8.2</b>	6.4	5.1	5.7	4.6	4.1	--
	Monitor:	0016	0016	0016	0016	0016	0016	0016	0016	0016	0016	3010	0019	0016	0016	--
November	Max CO:	<b>11.6</b>	<b>9.8</b>	9.3	7.6	7.5	9.9	8.8	7.8	8.1	<b>10.6</b>	5.9	5.4	5.1	4.3	--
	Monitor:	0016	0016	9996	0016	0016	0022	0022	0022	0016	0022	0022	0016	0016	0019	--
December	Max CO:	10.0	9.8	<b>10.1</b>	<b>9.2</b>	<b>10.5</b>	<b>10.2</b>	8.8	<b>9.5</b>	7.2	7.7	<b>7.4</b>	6.6	5.5	5.4	--
	Monitor:	0016	0016	0016	0016	0016	0022	0022	0022	0016	0019	0019	0022	0019	0019	--
Maximum 8-Hour CO		11.6	9.8	10.1	9.2	10.5	10.2	10.0	9.5	8.2	10.6	7.4	7.7	5.5	6.1	--
Month		Nov	Nov	Dec	Dec	Dec	Dec	Jan	Dec	Oct	Nov	Dec	Jan	Jan	Jan	--
Monitor		0016	0016	0016	0016	0016	0022	0022	0022	0016	0022	0019	3006	0019	0019	--

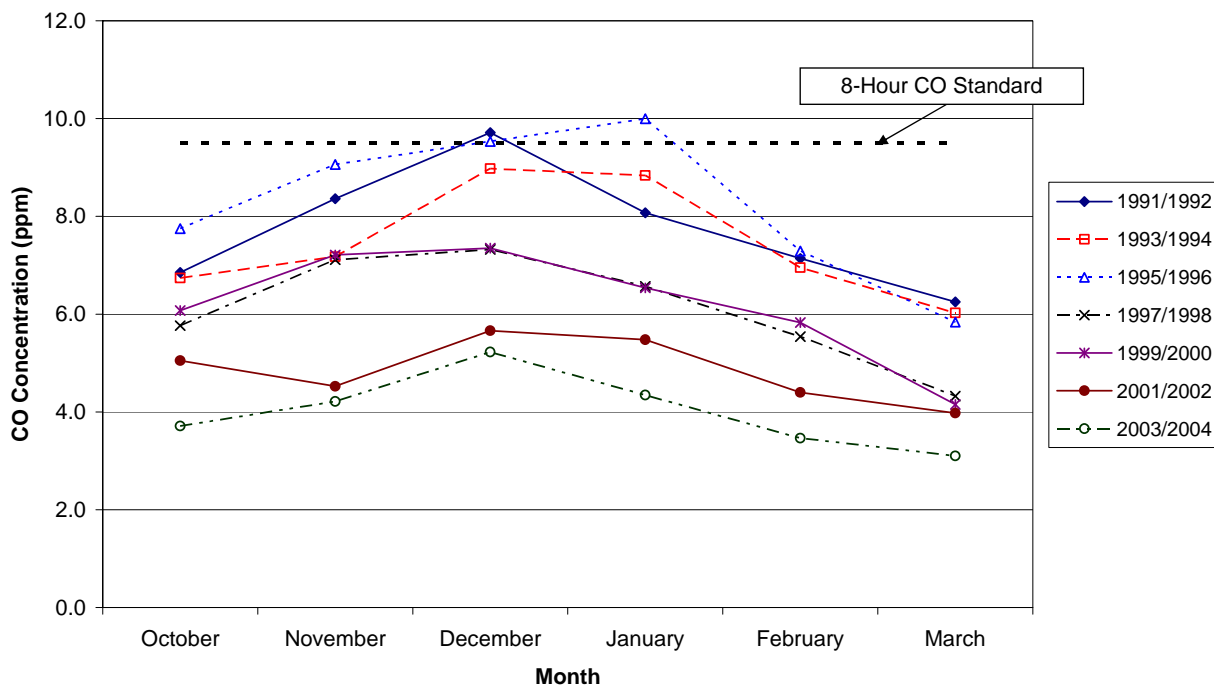
**Table 7**  
**Monthly 2<sup>nd</sup> Maximum 8-Hour CO Concentrations in Maricopa County, Arizona**  
**(Based on October to March Data)**

Month	Max CO/ Monitor	2nd Maximum 8-Hour CO Concentration (ppm)														
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
January	Max CO:	8.5	7.9	8.1	7.5	8.8	6.6	<b>10.0</b>	6.4	6.6	6.7	6.5	<b>6.6</b>	<b>5.5</b>	<b>5.5</b>	<b>4.3</b>
	Monitor:	0016	0016	9996	0016	0016	0016	0022	0022	0022	0016	0019	0016	0022	0019	0019
February	Max CO:	7.4	6.9	7.1	6.3	7.0	6.2	7.3	6.5	5.5	5.8	5.8	4.5	4.4	4.0	3.5
	Monitor:	0016	0016	0016	9996	0016	0016	0022	0022	0016	0016	0016	0016	0019	0016	0016
March	Max CO:	6.6	4.9	6.3	6.5	6.0	4.2	5.8	5.8	4.3	4.8	4.2	3.9	4.0	3.2	3.1
	Monitor:	0016	0016	0016	0016	0016	0019	0016	0022	0022	0016	0016	0016	0019	0016	0016
October	Max CO:	9.1	6.9	7.7	6.7	7.9	7.7	5.5	5.8	6.4	6.1	4.7	5.1	4.1	3.7	--
	Monitor:	0016	0016	0016	0016	0016	0022	0022	3002	0016	0016	0019	0022	0016	0019	--
November	Max CO:	8.6	8.4	9.0	7.2	7.3	9.1	7.9	7.1	<b>7.0</b>	7.2	5.4	4.5	4.7	4.2	--
	Monitor:	0016	0016	9996	0016	0016	0022	0022	0016	0019	0022	0019	0016	0016	0016	--
December	Max CO:	<b>9.9</b>	<b>9.7</b>	<b>9.7</b>	<b>9.0</b>	<b>10.4</b>	<b>9.5</b>	8.3	<b>7.3</b>	6.7	<b>7.4</b>	<b>7.1</b>	5.7	5.4	5.2	--
	Monitor:	0016	0016	9996	0016	0016	0022	0022	0022	0016	0016	0019	0019	0019	0016	--
Maximum 2nd Max 8-Hour		9.9	9.7	9.7	9.0	10.4	9.5	10.0	7.3	7.0	7.4	7.1	6.6	5.5	5.5	--
Month		Dec	Dec	Dec	Dec	Dec	Dec	Jan	Dec	Nov	Dec	Dec	Jan	Jan	Jan	--
Monitor		0016	0016	9996	0016	0016	0022	0022	0016	0019	0016	0019	0016	0022	0019	--

**Figure 4**  
**1st Maximum 8-Hour Ambient CO Concentrations by Month**  
**Maricopa County, Arizona**  
**(Every Other Year -- 1991/1992 through 2003/2004)**



**Figure 5**  
**2nd Maximum 8-Hour Ambient CO Concentrations by Month**  
**Maricopa County, Arizona**  
**(Every Other Year -- 1991/1992 through 2003/2004)**





## February and March Results by Monitor

Because the months of February and March are of greatest interest in this study, 8-hour ambient CO levels were evaluated for individual monitors for these two months. The results are presented in Tables 8 and 9, which summarize the first maximum and second maximum 8-hour CO concentrations for the months of February and March, respectively. Based on these results, neither the first maximum nor the second maximum 8-hour CO concentrations observed in February and March have been above the ambient standard in the Phoenix area during the 1990 to 2004 timeframe. In addition, first and second maximum concentrations have decreased by roughly 50% during this timeframe.

The geographic locations of all carbon monoxide monitoring sites in Maricopa County are shown in Figure 6. As discussed in more detail below, the highest CO levels currently being recorded in the Phoenix area are in the vicinity of the Interstate-10/Interstate-17 interchange.

Eight-hour ambient CO trends from 1990 to 2004 are also presented graphically for individual monitors for the months of February and March. Trend lines were prepared for the 14 monitoring sites that were active as of 2004, and this presentation was intended to identify individual monitoring sites that may not be experiencing the downward trends in ambient CO levels that have occurred in the area maximum values. Because of the large number of sites, it was necessary to break the data into two groups—the seven sites with the highest CO values and the seven sites with the lowest CO values—before plotting the results. The results of this analysis are shown in the following figures:

- Figure 7a - February first maximum 8-hour CO levels for the seven highest monitoring sites in Maricopa County;
- Figure 7b - February first maximum 8-hour CO levels for the seven lowest monitoring sites in Maricopa County;
- Figure 8a - February second maximum 8-hour CO levels for the seven highest monitoring sites in Maricopa County;
- Figure 8b - February second maximum 8-hour CO levels for the seven lowest monitoring sites in Maricopa County;
- Figure 9a - March first maximum 8-hour CO levels for the seven highest monitoring sites in Maricopa County;
- Figure 9b - March first maximum 8-hour CO levels for the seven lowest monitoring sites in Maricopa County;
- Figure 10a - March second maximum 8-hour CO levels for the seven highest monitoring sites in Maricopa County; and
- Figure 10b - March second maximum 8-hour CO levels for the seven lowest monitoring sites in Maricopa County.

**Table 8**  
**1<sup>st</sup> and 2<sup>nd</sup> Maximum 8-Hour CO Concentrations in Maricopa County, Arizona**  
**for the Month of February**

Monitor	Location	1st/2nd Max	Maximum 8-Hour CO Concentration (ppm)														
			1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
0013	4732 S Central Ave-South Phoenix Station	1st Max	5.2	4.7	3.6	2.7	3.1	4.4	4.9	3.9	3.5	3.0	---	---	---	---	---
		2nd Max	4.7	3.4	3.1	2.4	2.9	3.6	4.4	3.2	3.0	3.0	---	---	---	---	---
0016	3315 W Indian School Rd, Phoenix	1st Max	7.6	7.9	7.3	6.6	7.5	6.6	7.5	6.7	6.2	6.3	6.9	4.5	4.4	4.3	3.7
		2nd Max	7.4	6.9	7.1	6.2	7.0	6.2	6.1	5.6	5.5	5.8	5.8	4.5	4.3	4.0	3.5
0019	3847 W Earll Dr-West Phoenix Station	1st Max	6.6	7.6	5.4	5.8	6.6	6.2	6.9	7.0	4.2	5.8	6.8	5.0	4.4	4.2	3.2
		2nd Max	6.5	6.3	5.3	5.6	6.2	5.8	6.2	5.3	4.1	5.7	5.8	4.4	4.4	3.7	3.1
0022	27th Ave/Grand Ave/Thomas Rd,Phoenix	1st Max	---	---	---	---	---	6.2	7.6	6.7	4.2	5.6	5.8	3.7	4.6	---	---
		2nd Max	---	---	---	---	---	6.2	7.3	6.5	3.8	4.8	5.0	3.4	4.2	---	---
1003	Broadway & Brooks, Mesa	1st Max	---	3.5	2.5	2.7	4.0	3.3	3.3	3.6	2.1	2.3	2.4	1.5	1.9	1.8	1.7
		2nd Max	---	2.7	2.5	2.5	3.8	3.3	3.0	2.3	1.9	2.3	2.0	1.2	1.8	1.7	1.6
1004	601 E Butler Dr & N 6th St,Phoenix	1st Max	5.1	4.3	2.9	3.4	4.2	3.5	3.0	3.2	2.5	2.8	2.8	2.1	2.2	2.0	---
		2nd Max	4.6	3.7	2.8	2.9	4.1	3.3	2.9	2.7	2.4	2.7	2.7	1.9	2.1	2.0	---
2001	6000 W Olive Ave,Glendale	1st Max	5.0	2.1	3.3	2.6	3.3	2.9	3.2	2.6	2.8	3.1	2.3	1.9	2.0	2.0	2.1
		2nd Max	4.8	1.8	3.1	2.5	3.0	2.7	3.0	2.6	2.1	2.9	2.2	1.8	1.7	1.9	1.4
2004	13665 N Scottsdale Rd, Scottsdale	1st Max	2.3	2.3	2.2	2.0	2.7	---	---	---	---	---	---	---	---	---	---
		2nd Max	2.1	2.0	2.1	2.0	2.3	---	---	---	---	---	---	---	---	---	---
3002	1845 E Roosevelt St-Central Phoenix Stn	1st Max	6.6	7.5	5.2	5.2	5.6	6.6	6.4	5.5	3.9	6.0	5.0	3.7	3.9	2.6	2.4
		2nd Max	5.8	5.8	4.3	3.7	4.8	5.6	6.0	4.9	3.7	4.0	4.8	3.3	3.6	2.6	2.0
3003	2857 N Miller Rd-S Scottsdale Stn	1st Max	4.7	4.2	3.9	2.8	3.7	4.0	3.3	3.3	2.2	3.0	2.8	3.0	2.3	1.8	1.9
		2nd Max	4.4	3.6	3.7	2.8	3.1	3.7	3.2	2.9	1.8	2.6	2.5	2.4	2.2	1.6	1.8
3005	525 N Lindsey Rd-Gilbert Station	1st Max	---	---	---	---	---	---	---	1.8	1.5	2.1	1.8	---	---	---	---
		2nd Max	---	---	---	---	---	---	---	1.7	1.4	1.8	1.8	---	---	---	---
3006	6180 W Encanto Blvd- Maryvale Station	1st Max	---	---	---	---	---	---	---	6.2	4.2	5.0	5.3	4.8	4.0	4.1	2.8
		2nd Max	---	---	---	---	---	---	---	4.9	4.0	4.6	5.3	4.2	3.9	3.8	2.7
3009	163 S Price Rd-West Chandler Station	1st Max	---	---	---	---	---	---	---	1.9	1.8	1.9	2.0	---	---	---	---
		2nd Max	---	---	---	---	---	---	---	1.8	1.7	1.9	1.7	---	---	---	---
3010	1128 N. 27th Ave- Greenwood Station	1st Max	---	---	---	---	---	---	---	6.2	4.5	5.6	4.8	4.5	3.9	4.0	2.9
		2nd Max	---	---	---	---	---	---	---	5.3	3.6	4.4	4.8	4.1	3.8	3.2	2.9
4003	33 W Tamarisk Ave, Phoenix	1st Max	---	---	---	---	---	---	---	---	---	---	4.3	2.8	3.7	3.0	2.3
		2nd Max	---	---	---	---	---	---	---	---	---	---	3.7	2.7	3.6	2.8	2.3
4004	Ellis & Frye Rd, Chandler	1st Max	---	---	---	---	---	---	---	---	---	---	---	1.2	2.2	1.9	1.3
		2nd Max	---	---	---	---	---	---	---	---	---	---	---	1.2	1.6	1.5	1.3
4005	1525 S College Ave, Tempe	1st Max	---	---	---	---	---	---	---	---	---	---	---	2.1	2.1	2.4	1.9
		2nd Max	---	---	---	---	---	---	---	---	---	---	---	2.1	2.1	2.4	1.5
4007	18600 N. Reems Road	1st Max	---	---	---	---	---	---	---	---	---	---	---	0.9	1.0	0.8	---
		2nd Max	---	---	---	---	---	---	---	---	---	---	---	0.8	1.0	0.8	---
4010	16825 N. Dysart	1st Max	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.8
		2nd Max	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.8
9996	2600 NW Grand Avenue	1st Max	---	---	7.0	6.4	---	---	---	---	---	---	---	---	---	---	---
		2nd Max	---	---	6.8	6.3	---	---	---	---	---	---	---	---	---	---	---
9997	4530 N 17th Avenue	1st Max	---	---	---	---	---	---	---	---	---	5.0	6.9	3.5	3.1	3.0	3.1
		2nd Max	---	---	---	---	---	---	---	---	---	4.8	5.7	3.4	3.0	2.8	2.7
Maximum 1st Max 8-Hour Concentration			7.6	7.9	7.3	6.6	7.5	6.6	7.6	7.0	6.2	6.3	6.9	5.0	4.6	4.3	3.7
Maximum 2nd Max 8-Hour Concentration			7.4	6.9	7.1	6.3	7.0	6.2	7.3	6.5	5.5	5.8	5.8	4.5	4.4	4.0	3.5

**Table 9**  
**1<sup>st</sup> and 2<sup>nd</sup> Maximum 8-Hour CO Concentrations in Maricopa County, Arizona**  
**for the Month of March**

Monitor	Location	1st/2nd Max	Maximum 8-Hour CO Concentration (ppm)															
			1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	
0013	4732 S Central Ave-South Phoenix Station	1st Max	4.4	3.6	3.1	2.8	3.8	2.3	4.1	3.0	2.3	2.8	---	---	---	---	---	
		2nd Max	3.5	3.1	2.6	2.3	3.3	2.3	3.8	2.7	2.3	2.5	---	---	---	---	---	
0016	3315 W Indian School Rd, Phoenix	1st Max	7.9	6.4	6.6	6.5	6.5	5.0	6.3	6.2	4.3	5.2	4.2	4.1	4.2	3.3	3.2	
		2nd Max	6.6	4.9	6.3	6.5	6.0	4.2	5.8	5.5	4.1	4.8	4.2	3.9	3.8	3.2	3.1	
0019	3847 W Earll Dr-West Phoenix Station	1st Max	5.3	4.8	4.9	5.7	5.2	5.7	4.9	5.9	4.1	4.6	4.1	4.3	4.1	3.3	2.9	
		2nd Max	5.1	3.8	4.3	5.1	4.4	4.2	4.6	4.8	4.1	4.2	3.9	3.3	4.0	2.8	2.8	
0022	27th Ave/Grand Ave/Thomas Rd,Phoenix	1st Max	---	---	---	---	---	4.0	6.0	5.8	4.3	4.6	3.8	3.5	4.3	---	---	
		2nd Max	---	---	---	---	---	3.8	5.3	5.8	4.3	4.4	3.5	3.0	3.5	---	---	
1003	Broadway & Brooks, Mesa	1st Max	---	2.3	2.4	2.0	2.5	1.6	2.6	2.4	1.7	2.2	2.1	1.2	1.7	1.1	1.2	
		2nd Max	---	1.9	1.4	2.0	1.8	1.5	2.2	2.4	1.4	1.6	1.4	1.1	1.6	1.0	1.2	
1004	601 E Butler Dr & N 6th St,Phoenix	1st Max	4.7	3.2	3.2	2.3	3.0	2.3	2.4	3.0	2.2	2.7	1.6	1.5	3.3	1.3	---	
		2nd Max	4.3	3.2	2.6	2.3	3.0	2.1	2.3	2.9	2.0	1.9	1.5	1.4	2.5	1.3	---	
2001	6000 W Olive Ave,Glendale	1st Max	2.8	1.9	2.0	2.3	2.3	1.9	2.4	2.6	1.8	2.3	1.9	1.6	2.2	1.3	1.1	
		2nd Max	2.5	1.6	1.9	2.2	2.2	1.9	1.9	2.5	1.8	1.9	1.9	1.4	1.6	1.3	1.1	
2004	13665 N Scottsdale Rd, Scottsdale	1st Max	2.3	1.6	1.8	2.1	2.0	---	---	---	---	---	---	---	---	---	---	
		2nd Max	2.0	1.5	1.8	1.8	1.8	---	---	---	---	---	---	---	---	---	---	
3002	1845 E Roosevelt St-Central Phoenix Stn	1st Max	4.9	4.9	3.9	4.9	4.6	4.2	6.6	5.0	3.9	3.8	3.4	2.6	2.9	2.2	2.6	
		2nd Max	4.6	3.7	3.7	4.4	4.1	4.1	4.4	4.9	3.3	3.5	3.1	2.4	2.5	2.2	2.2	
3003	2857 N Miller Rd-S Scottsdale Stn	1st Max	4.8	3.2	2.9	2.1	3.1	2.4	3.4	2.4	1.8	2.2	1.9	1.4	1.9	1.2	1.3	
		2nd Max	4.1	2.9	2.7	1.9	2.9	2.1	2.7	2.3	1.7	2.0	1.8	1.3	1.7	1.0	1.3	
3005	525 N Lindsey Rd-Gilbert Station	1st Max	---	---	---	---	---	---	---	1.7	1.1	1.2	1.4	---	---	---	---	
		2nd Max	---	---	---	---	---	---	---	1.4	1.0	1.1	1.2	---	---	---	---	
3006	6180 W Encanto Blvd- Maryvale Station	1st Max	---	---	---	---	---	---	---	5.6	3.5	3.9	3.7	4.0	3.5	2.9	2.4	
		2nd Max	---	---	---	---	---	---	---	5.2	3.3	3.6	3.4	3.9	3.0	2.9	2.3	
3009	163 S Price Rd-West Chandler Station	1st Max	---	---	---	---	---	---	---	1.9	1.5	1.5	2.1	---	---	---	---	
		2nd Max	---	---	---	---	---	---	---	1.9	1.4	1.3	1.3	---	---	---	---	
3010	1128 N. 27th Ave- Greenwood Station	1st Max	---	---	---	---	---	---	---	5.6	4.4	4.6	3.9	3.9	3.1	2.7	3.5	
		2nd Max	---	---	---	---	---	---	---	5.2	3.6	3.6	3.5	3.2	2.9	2.7	3.0	
4003	33 W Tamarisk Ave, Phoenix	1st Max	---	---	---	---	---	---	---	---	---	---	2.6	2.3	2.4	2.3	2.4	
		2nd Max	---	---	---	---	---	---	---	---	---	---	2.4	2.2	2.3	1.7	2.0	
4004	Ellis & Frye Rd, Chandler	1st Max	---	---	---	---	---	---	---	---	---	---	---	1.4	1.3	1.2	1.3	
		2nd Max	---	---	---	---	---	---	---	---	---	---	---	1.1	1.3	1.1	1.2	
4005	1525 S College Ave, Tempe	1st Max	---	---	---	---	---	---	---	---	---	---	---	1.5	2.0	1.4	1.1	
		2nd Max	---	---	---	---	---	---	---	---	---	---	---	1.4	1.7	1.2	1.1	
4007	18600 N. Reems Road	1st Max	---	---	---	---	---	---	---	---	---	---	---	0.9	0.8	1.2	---	
		2nd Max	---	---	---	---	---	---	---	---	---	---	---	0.8	0.7	0.8	---	
4010	16825 N. Dysart	1st Max	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.9	
		2nd Max	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.9	
9996	2600 NW Grand Avenue	1st Max	---	---	5.2	5.5	---	---	---	---	---	---	---	---	---	---	---	
		2nd Max	---	---	5.0	5.4	---	---	---	---	---	---	---	---	---	---	---	
9997	4530 N 17th Avenue	1st Max	---	---	---	---	---	---	---	---	---	4.1	3.7	2.7	2.8	2.7	2.6	
		2nd Max	---	---	---	---	---	---	---	---	---	3.8	3.5	2.5	2.8	2.5	2.2	
Maximum 1st Max 8-Hour Concentration			7.9	6.4	6.6	6.5	6.5	5.7	6.6	6.2	4.4	5.2	4.2	4.3	4.3	3.3	3.5	
Maximum 2nd Max 8-Hour Concentration			6.6	4.9	6.3	6.5	6.0	4.2	5.8	5.8	4.3	4.8	4.2	3.9	4.0	3.2	3.1	

**Figure 6**  
**Carbon Monoxide Monitoring Sites in Maricopa County**

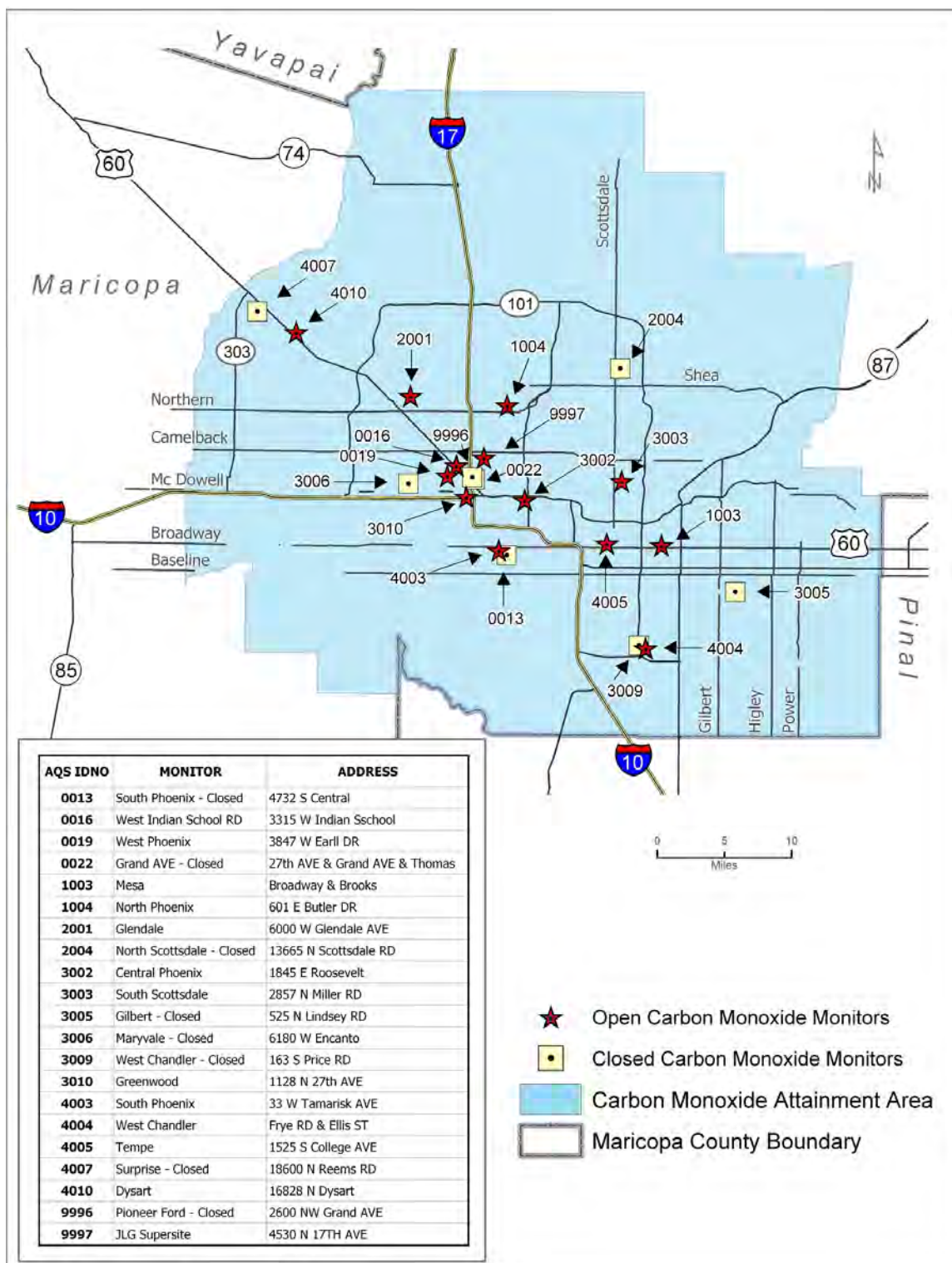


Figure 7a

February First Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Highest Monitoring Sites in Maricopa County

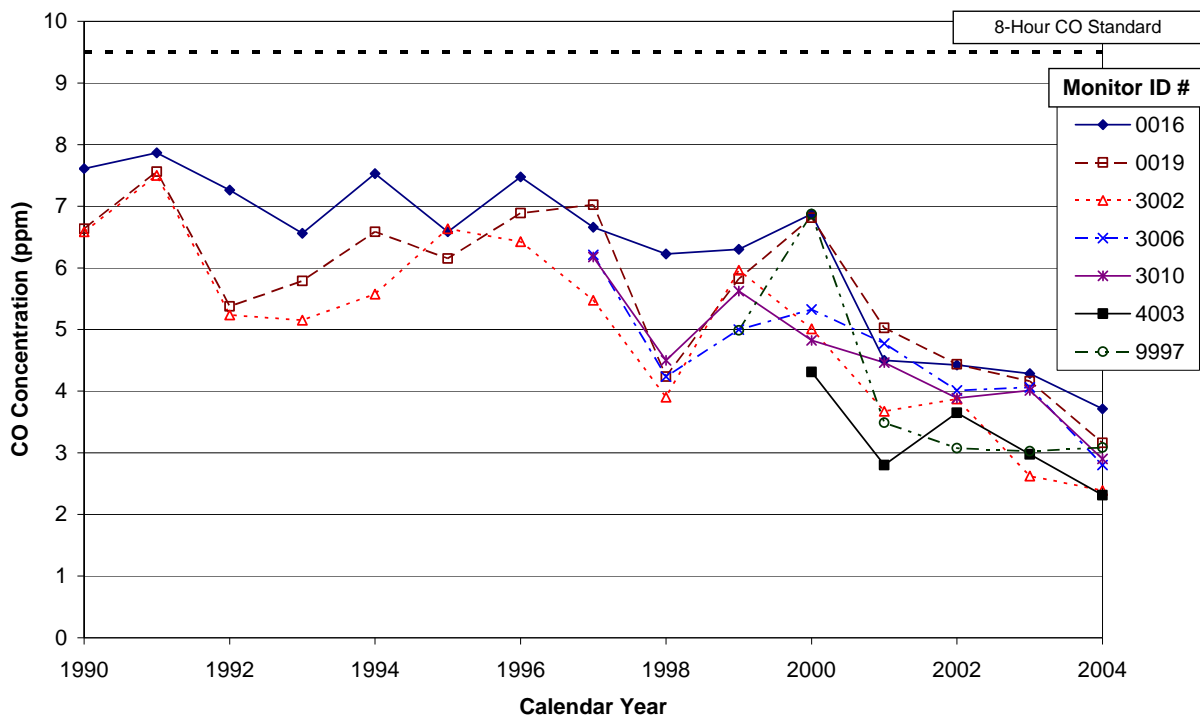


Figure 7b

February First Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Lowest Monitoring Sites in Maricopa County

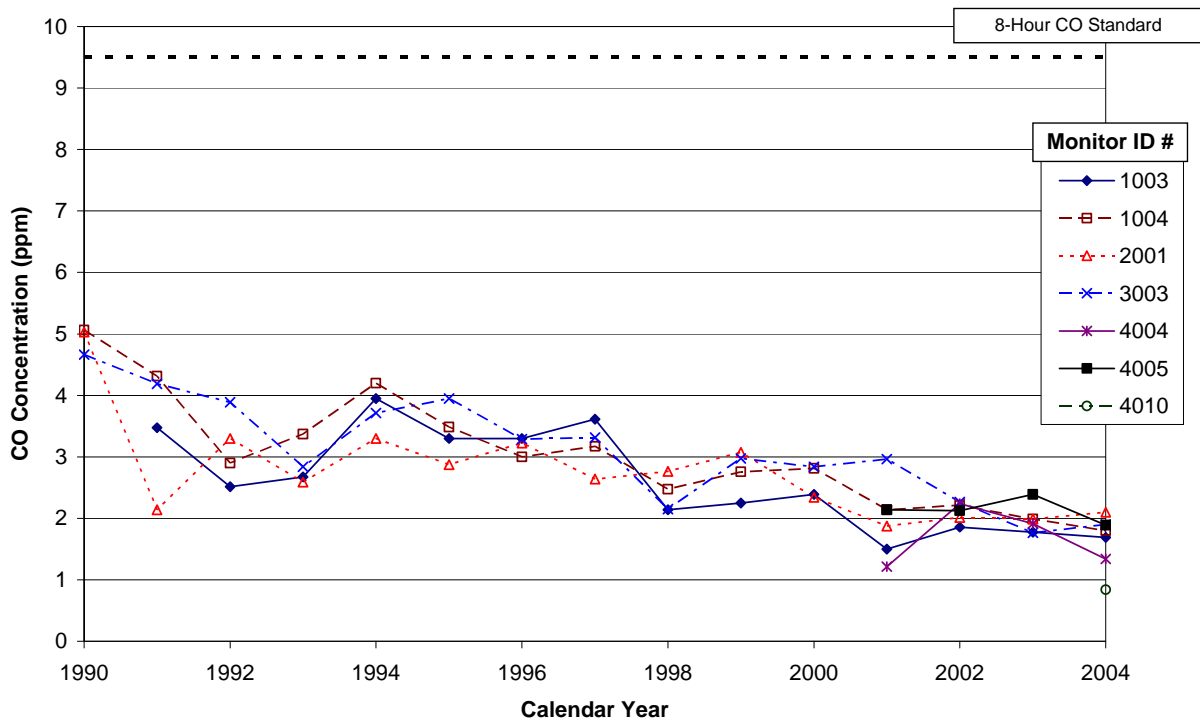


Figure 8a

**February Second Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Highest Monitoring Sites in Maricopa County**

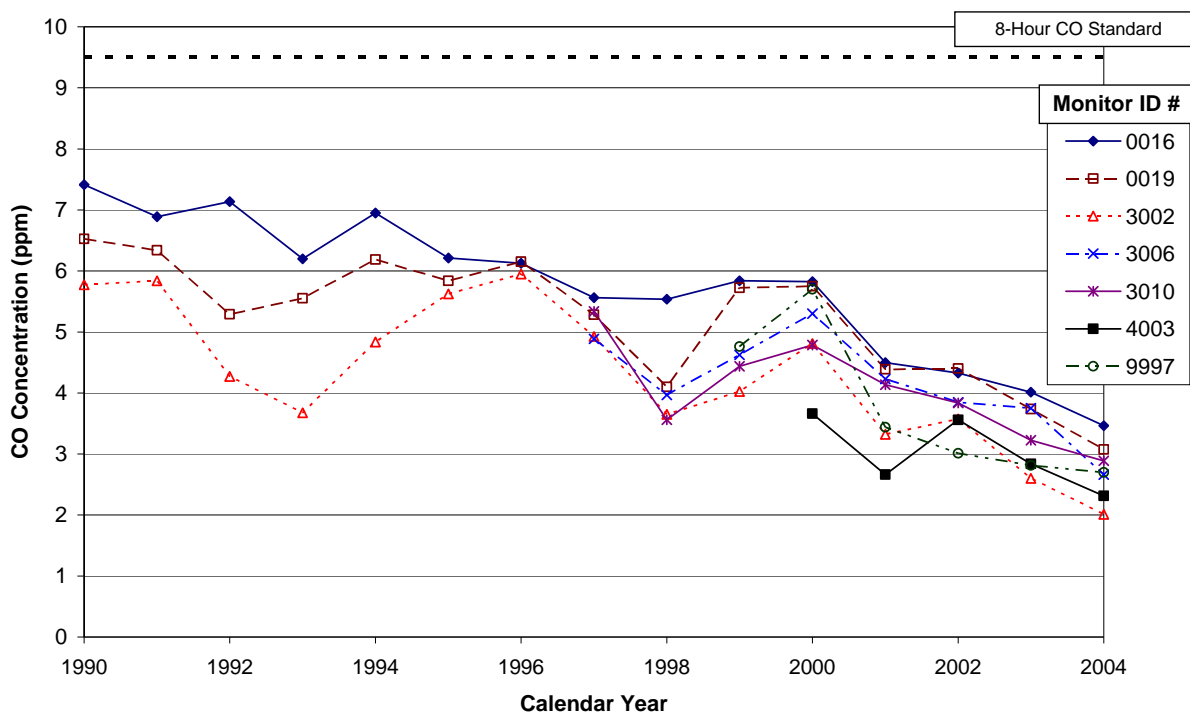


Figure 8b

**February Second Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Lowest Monitoring Sites in Maricopa County**

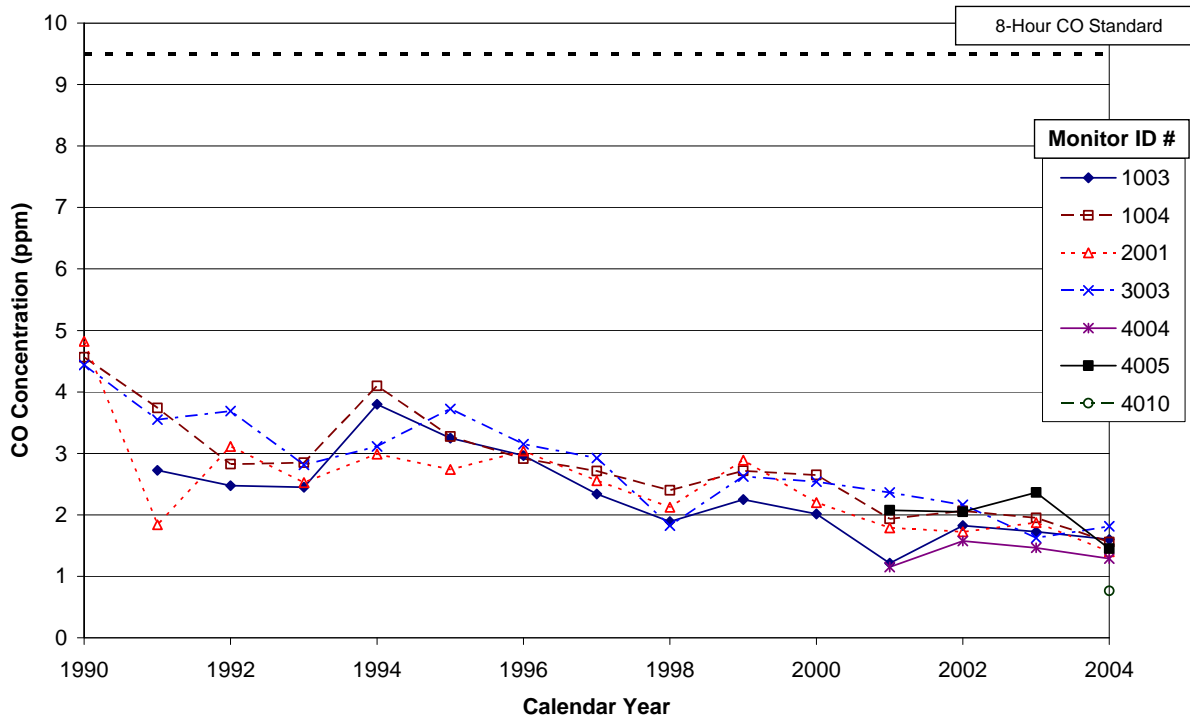


Figure 9a

March First Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Highest Monitoring Sites in Maricopa County

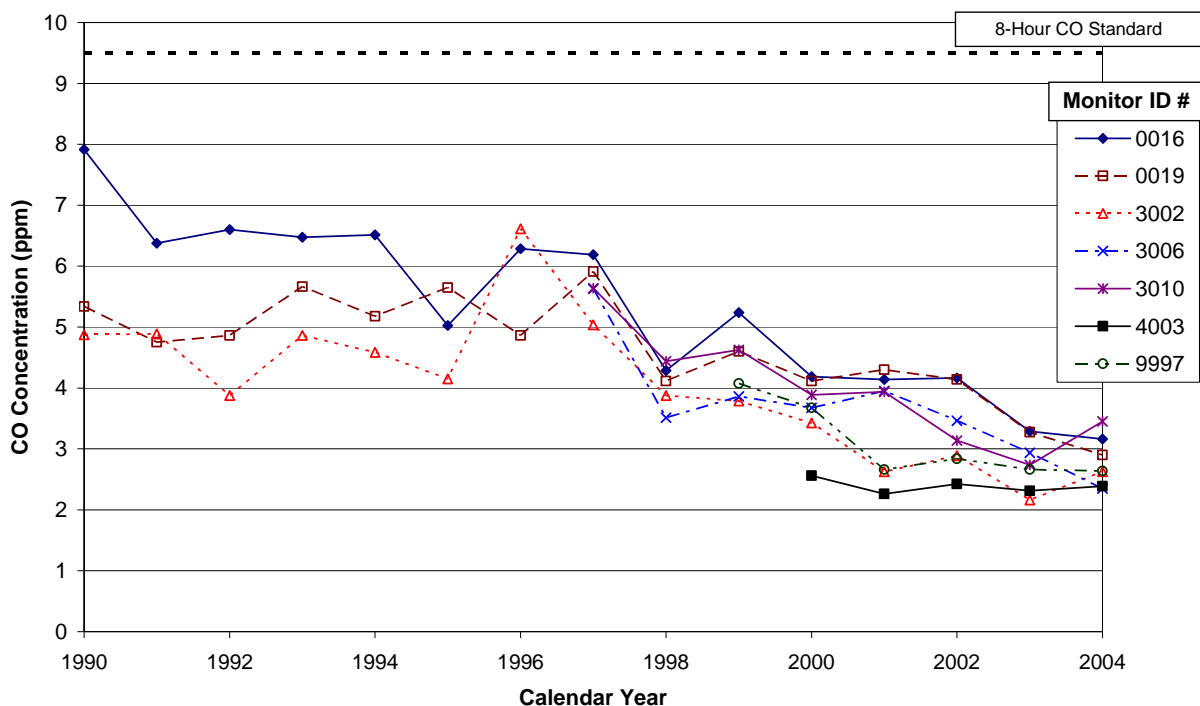


Figure 9b

March First Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Lowest Monitoring Sites in Maricopa County

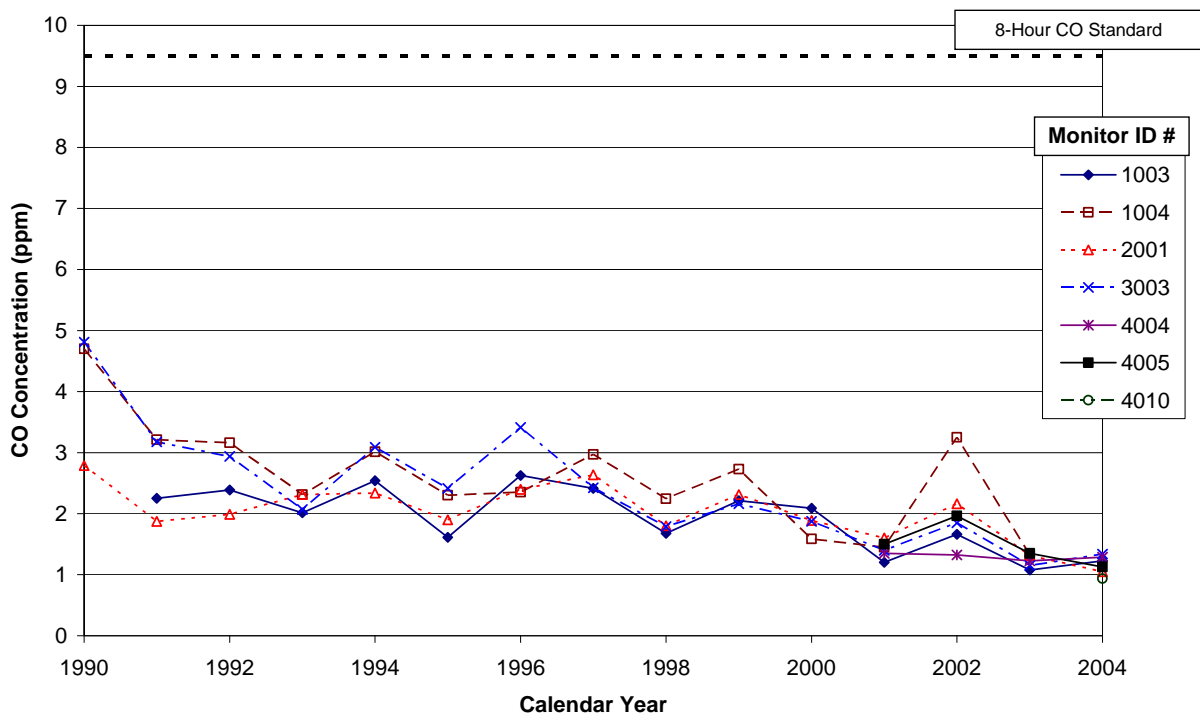


Figure 10a

March Second Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Highest Monitoring Sites in Maricopa County

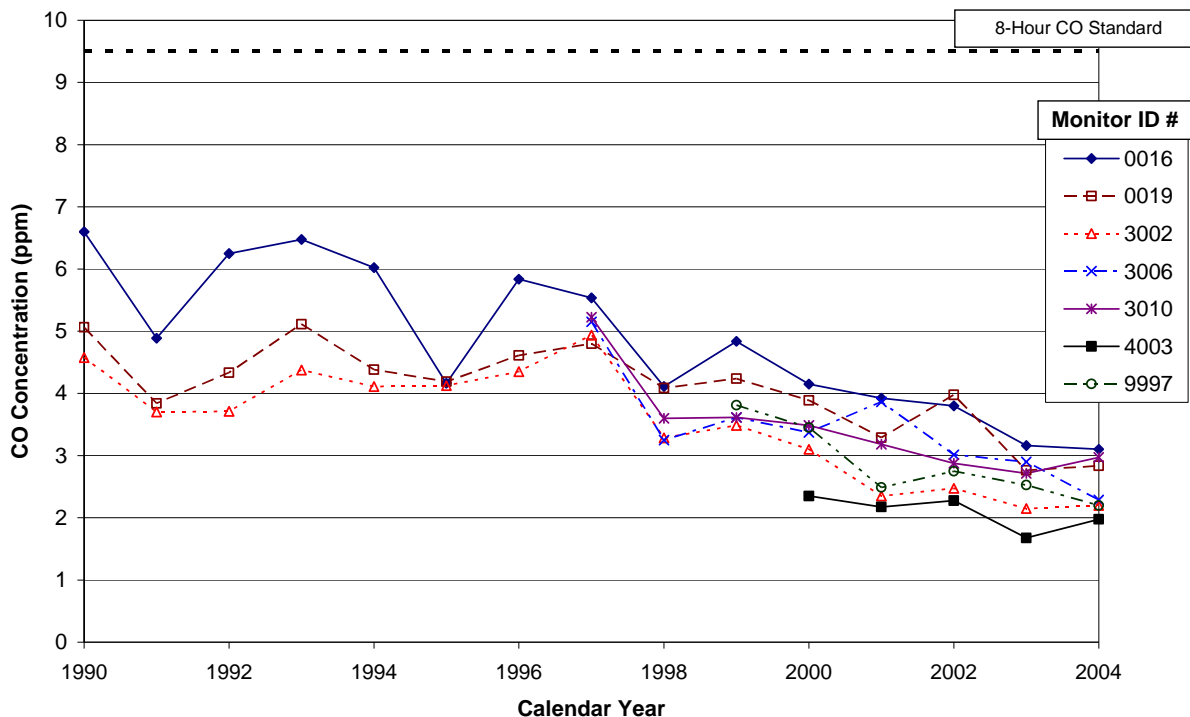
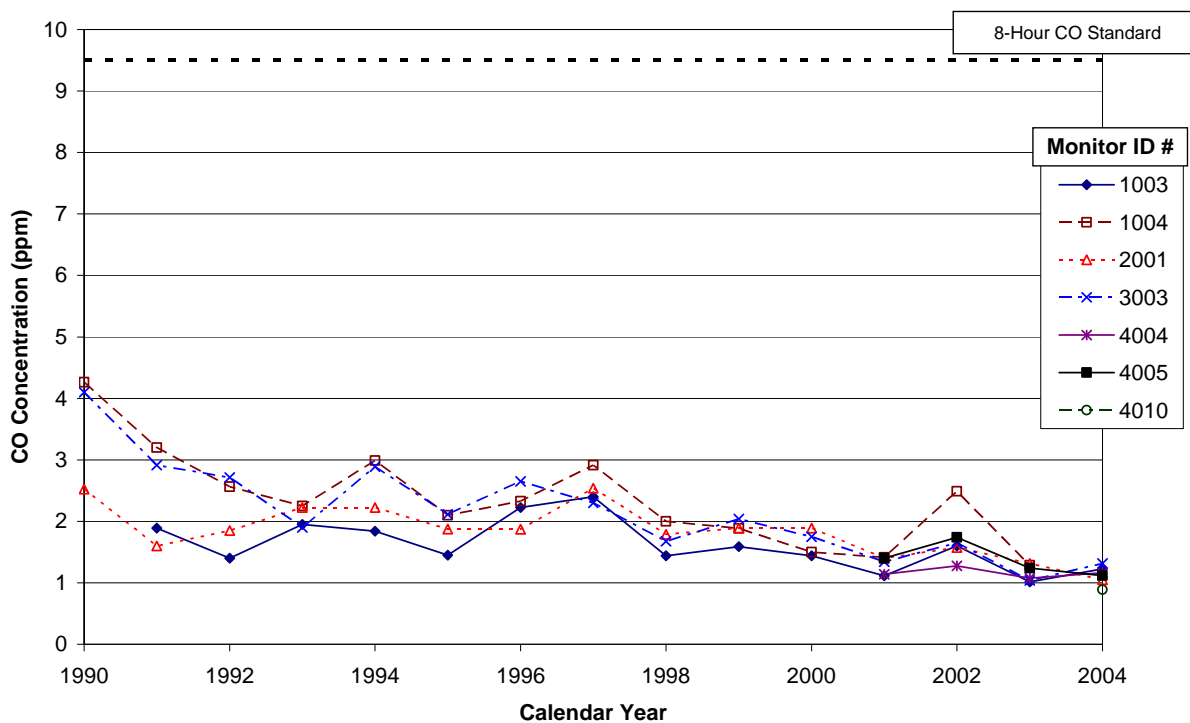


Figure 10b

March Second Maximum 8-Hour Ambient CO Levels by Monitor  
Based on the Seven Lowest Monitoring Sites in Maricopa County





The above results indicate that all sites generally demonstrate a downward trend in ambient CO levels, with that trend being more pronounced for sites recording the highest CO concentrations (i.e., those with the most room for improvement).

### Results for Specific Monitors

Based on the results presented in the above tables and figures, only two monitors currently in operation have recorded exceedances of the 8-hour CO standard (i.e., second-high CO concentrations equal to or greater than 9.5 ppm) since 1990:

- Monitor #0016 - 3315 W. Indian School Rd, Phoenix; and
- Monitor #0019 - 3847 W. Earll Dr-West Phoenix Station, Phoenix.

These monitors typically record the highest CO levels in the Phoenix area. Another monitor currently in operation that records ambient CO concentrations in the same range as Monitors 0016 and 0019 is:

- Monitor #3010 - 1128 N. 27<sup>th</sup> Ave - Greenwood Station, Phoenix.

In addition, Monitor #3010 recorded first maximum and second maximum 8-hour CO concentrations for the month of March in calendar year 2004. A more detailed map with the location of these specific monitors is shown in Figure 11. As noted above, the highest CO levels currently being recorded in the Phoenix area are in the vicinity of the Interstate-10/Interstate-17 interchange.

Because these three monitors (i.e., #0016, #0019, and #3010) would likely be most severely impacted by a change in wintertime gasoline properties (in terms of compliance with the NAAQS for CO), trends in 8-hour CO concentrations were evaluated independently for these monitors and the results are plotted in the following figures:

- Figures 12 and 13: These figures show the trends in first maximum and second maximum 8-hour CO concentrations for Monitor #0016. Results are presented from 1990 to 2004 for the months of October, November, December, January, February, and March.
- Figures 14 and 15: First and second maximum 8-hour CO concentrations from 1990 to 2004 are shown in these figures for Monitor #0019.
- Figures 16 and 17: First and second maximum 8-hour CO concentrations from 1997 to 2004 are shown in these figures for Monitor #3010.

**Figure 11**  
**Detailed Locations of the Three Monitoring Sites Recording the Highest CO Concentrations in Maricopa County**



**Figure 12**  
**First Maximum 8-Hour Ambient CO Levels for October through March**  
**Monitor #0016 (3315 W. Indian School Rd.)**

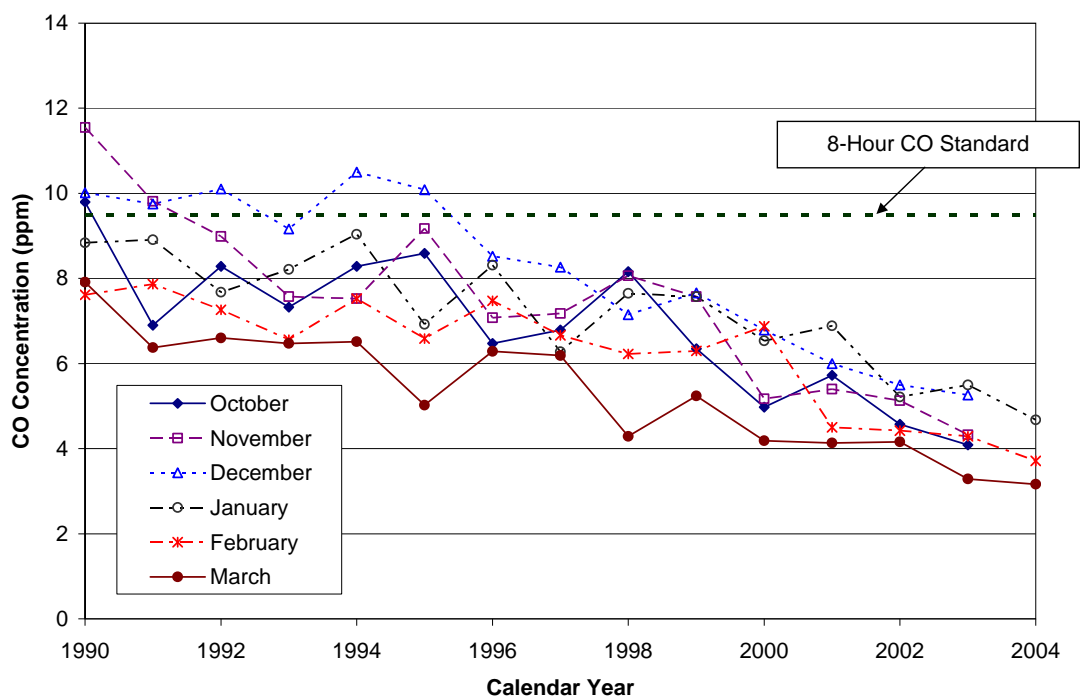


Figure 13

**Second Maximum 8-Hour Ambient CO Levels for October through March  
Monitor #0016 (3315 W. Indian School Rd.)**

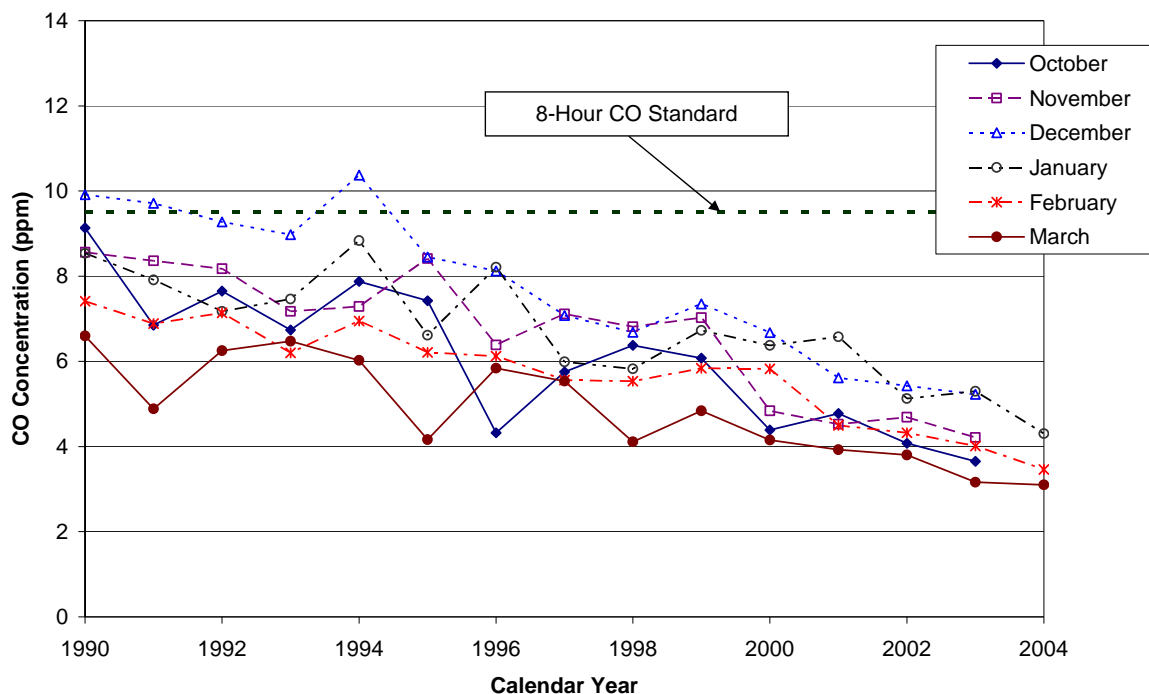


Figure 14

**First Maximum 8-Hour Ambient CO Levels for October through March  
Monitor #0019 (3847 W. Earll Dr.)**

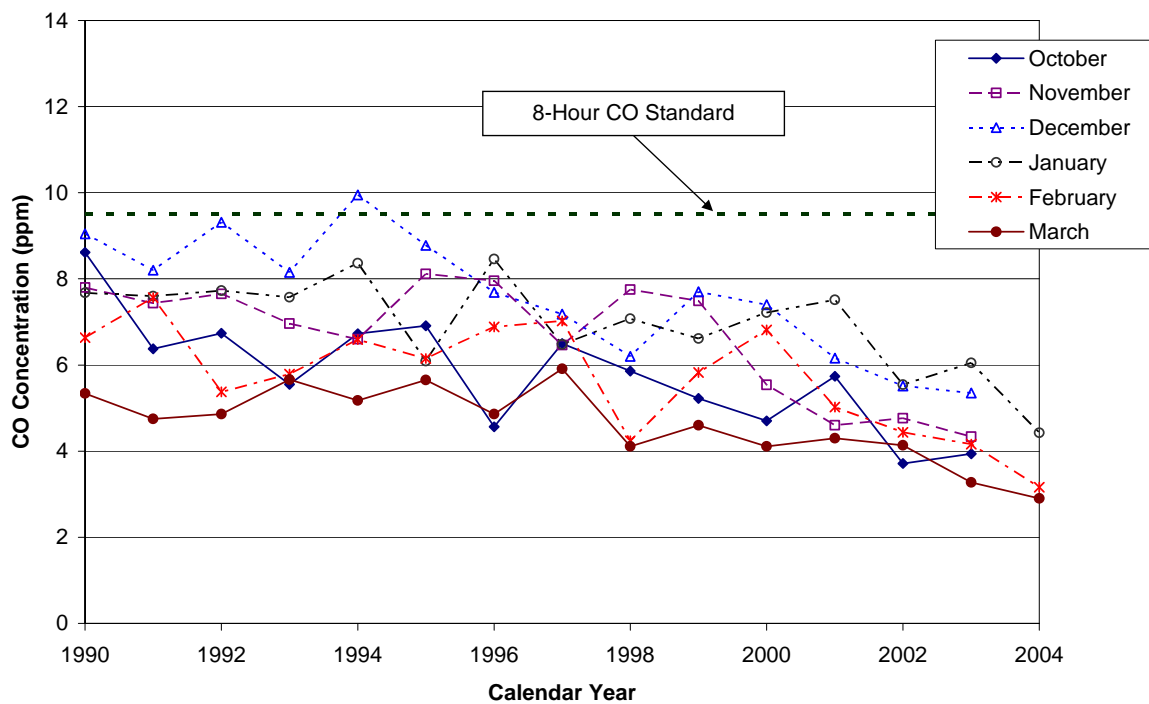


Figure 15

**Second Maximum 8-Hour Ambient CO Levels for October through March  
Monitor #0019 (3847 W. Earll Dr.)**

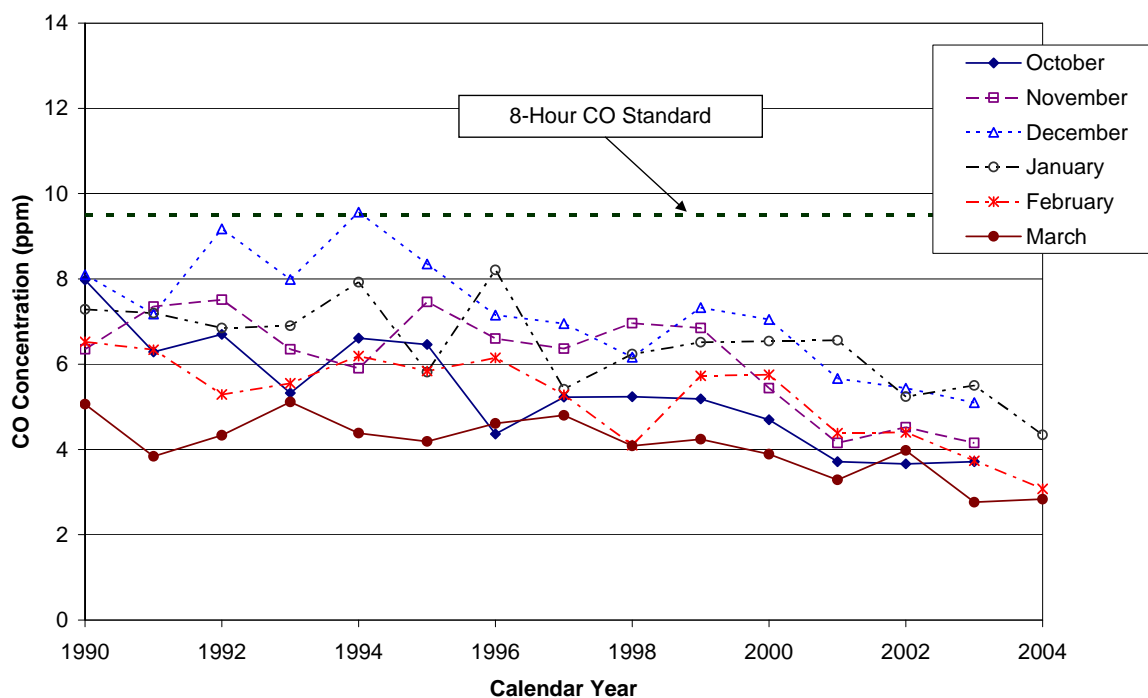
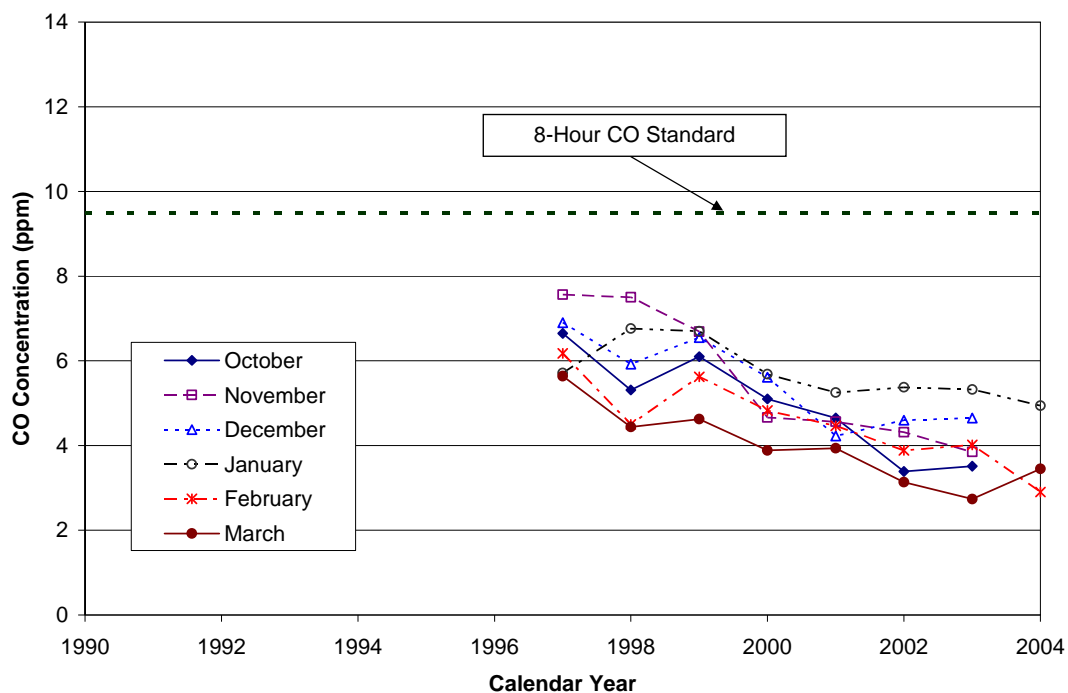


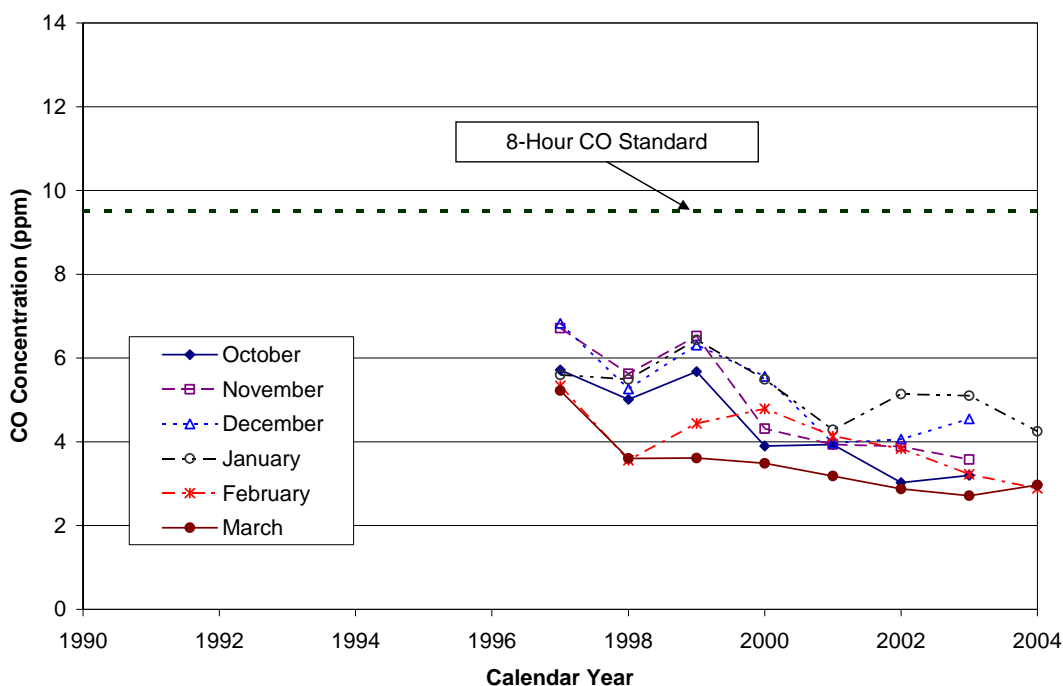
Figure 16

**First Maximum 8-Hour Ambient CO Levels for October through March  
Monitor #3010 (1128 N. 27th Ave.)**



**Figure 17**

**Second Maximum 8-Hour Ambient CO Levels for October through March  
Monitor #3010 (1128 N. 27th Ave.)**



Several points are worth noting with respect to Figures 12 to 17:

- There has been a decreasing trend in ambient CO concentrations over the last 15 years;
- The downward trend has occurred in all CO season months; and
- In the last four years (2001 to 2004), first and second maximum 8-hour CO concentrations have generally continued to decrease and have been well below the ambient standard.

This last point can also be seen by reviewing the first and second maximum 8-hour CO concentrations as a percentage of the ambient CO standard (9.5 ppm). These calculations were performed and the results are shown in Table 10 for Monitors #0016, #0019, and #3010 for the months of February and March. In all but one case, the 8-hour averages are less than half of the ambient standard. Thus, there appears to be room for CO emissions increases without compromising the ability of the area to maintain compliance with the NAAQS for CO.

<b>Table 10</b> <b>First Maximum and Second Maximum 8-Hour CO Concentrations</b> <b>As a Percentage of the Ambient Standard for 2001 to 2004</b>					
Monitor	Year	February		March	
		1 <sup>st</sup> Max	2 <sup>nd</sup> Max	1 <sup>st</sup> Max	2 <sup>nd</sup> Max
0016	2004	39%	37%	34%	32%
	2003	45%	42%	35%	34%
	2002	46%	45%	44%	40%
	2001	47%	47%	43%	41%
0019	2004	34%	33%	31%	29%
	2003	44%	39%	35%	31%
	2002	46%	46%	43%	37%
	2001	53%	46%	45%	41%
3010	2004	31%	31%	37%	33%
	2003	42%	34%	28%	28%
	2002	41%	40%	33%	29%
	2001	47%	43%	41%	34%

## 4. EMISSIONS IMPACTS OF FUEL SPECIFICATION CHANGES

This section of the report presents estimates of the CO emissions impact of changes to the wintertime gasoline specifications in the Phoenix metropolitan area during the months of February and March. Because on-road motor vehicles are the largest source of CO emissions in the Phoenix metropolitan area (accounting for about 75% of total CO), the focus of this analysis was on on-highway vehicles.<sup>\*</sup> However, relaxation of the wintertime oxygenate requirement will also impact CO emissions from gasoline-fueled nonroad engines. Thus, we have also addressed that source in the inventory estimates presented below.

As requested in the Scope of Work for this project, the starting point for these estimates was the inventory developed by MAG for the “Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area.”<sup>1</sup> (That report will be referred to simply as the “Maintenance Plan” in the following discussion.) However, the Maintenance Plan inventory was developed based on a December design day, which would be expected to have different temperature characteristics than observed during the February and March timeframe that is of interest in this study. As a result, although many of the inputs used for emissions modeling in this study are consistent with those used in the Maintenance Plan, Sierra developed separate temperature inputs to reflect high-CO days observed in February and March.

An emissions inventory is developed by multiplying an emission rate (e.g., grams per mile of CO) by a measure of activity (e.g., vehicle miles traveled, or VMT). For on-road motor vehicles, CO emission rates are developed using EPA’s MOBILE6 model,<sup>\*\*</sup> and VMT estimates are generally developed using a travel demand model configured for the urban area being evaluated. The MOBILE6 inputs and the VMT estimates used to generate the on-road motor vehicle inventory estimates for this study are described below. That is followed by a discussion of the emissions inventory for nonroad engines and equipment.

### MOBILE6 Inputs

Baseline Inputs - To the extent possible, the MOBILE6 input files configured for this study were developed to match the inputs used by MAG in the Maintenance Plan. Because that model is used nationwide (except for California) to estimate emissions from on-highway vehicles, there is a variety of inputs that users must specify to tailor a model

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<sup>\*</sup> In fact, CO emissions from all sources other than on-highway vehicles (i.e., point, area, and nonroad sources) were considered “background” emissions in modeling performed for the Maintenance Plan.

<sup>\*\*</sup> Note that the most recent official version of MOBILE6, MOBILE6.2 (dated September 24, 2003), was used for the emissions modeling in this study.

run to best reflect local conditions. The inputs used for this analysis are summarized below. Note that these inputs often mirror those described in Appendix VII-i of the Maintenance Plan, and that document should be consulted for additional detail if desired.

- *Calendar Year* - The Scope of Work for this study called for the analysis of emissions for calendar years 2005, 2010, and 2015. In addition, calendar year 2004 was evaluated, as that serves as the baseline for the “roll-forward” analysis presented in the next section of this report.
- *I/M Program Parameters* - MOBILE6 requires detailed inputs when specifying an I/M program. These inputs include I/M program type, I/M start year, stringency, waiver rates, etc. Generally the same inputs were used for this analysis as in the Maintenance Plan. However, the I/M cutpoints file (which was provided to Sierra by MAG) was modified to reflect each calendar year modeled. That was necessary because the I/M cutpoints are specified by vehicle age, and the vehicle ages covered by different cutpoints change with calendar year.
- *Anti-Tampering Program* - This was also configured to be consistent with the MOBILE6 file presented in Appendix VII-i of the Maintenance Plan.
- *Registration Distributions* - MAG developed local registration distribution data for use in the Maintenance Plan modeling. The registration data file used in that modeling was provided by MAG to Sierra for use in this effort.
- *Diesel Fractions* - Local estimates of the fraction of light-duty vehicle, light-duty truck 1, and light-duty truck 2 vehicle classes that are Diesel-powered were developed by MAG and used in the Maintenance Plan. However, because of inconsistencies in the light-duty truck Diesel fractions,<sup>\*</sup> revised fractions were applied only to the light-duty vehicle class. MOBILE6 defaults were used for all other vehicle classes.
- *Weekend Vehicle Use and Trip Length* - For the modeling performed in the Maintenance Plan, both a Friday and a Saturday was modeled, and the results were used in conjunction with the Urban Airshed Model. Thus, weekend vehicle activity was specified for the Saturday inventory. For this analysis, we focused only on Friday emissions, as the majority of high CO events occur very early on Saturday mornings. As a result, weekend vehicle activity was not specified in the model runs performed for this study.
- *Evaluation Month* - MOBILE6 allows the user to specify either January or July as the evaluation month. This analysis specified a January evaluation month, as that best reflects the February and March analyses conducted for this study.

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<sup>\*</sup> For example, 20.4% of the 1999 and newer model year light-duty truck 1 and light-duty truck 2 vehicle classes were assumed to be Diesel-powered in the MOBILE6 modeling performed for the Maintenance Plan. Discussions with MAG staff revealed that there were anomalies in the light-duty truck registration data used to develop this estimate.



- *Temperatures* - As noted above, the Maintenance Plan inventories were based on a December design day. Because the current evaluation is focused on February and March, the temperature inputs used for the Maintenance Plan modeling were not used here. A discussion of temperatures used for the current study is included later in this report.
- *Vehicle Speeds* - Hourly speed distributions for freeways and arterials were developed by MAG for five area types: (1) central business district, (2) urban area, (3) urban fringe, (4) suburban, and (5) rural. For this analysis, the speed distributions reflective of the central business district were used. That is because it was felt that those would be most reflective of the areas surrounding the monitors that record the highest CO levels in the Phoenix metropolitan area.
- *Fuel Parameter Inputs* - The following inputs were used by MAG to reflect the current wintertime gasoline in Phoenix:
  - RVP = 9.0 psi
  - Oxygenate = 3.5 wt% using ethanol
  - Sulfur = 30 ppm (average and maximum, which is the lowest value allowed in MOBILE6).

Note that two sets of baseline MOBILE6 input files were developed for each calendar year, month, and fuel scenario: one reflective of the I/M program described above and one without an I/M program. Consistent with MAG assumptions, it was assumed that 91.6% of the fleet operating within the nonattainment area will participate in the I/M program and 8.4% would not participate in the program. Thus, the emission factors from the two model runs were weighted accordingly.

A sample set of MOBILE6 files developed for this study is contained in Appendix A. This set reflects model runs prepared for March of 2010.

MOBILE6 Inputs for Relaxed Fuel Standards - To determine the emissions impacts of relaxing the wintertime gasoline requirements in the Phoenix Metropolitan area, the fuel inputs used in the MOBILE6 runs were modified accordingly. For the RVP input, the ASTM Standard D 4814-01a<sup>7</sup> was used to establish the maximum RVP for the months of February and March. Based on Table 4 of that standard, Southern Arizona is listed as class D/C for February and class C/B for March. The maximum gasoline volatility associated with these ASTM classes are:

- Class D = 13.5 psi
- Class C = 11.5 psi
- Class B = 10.0 psi

Both February and March reflect transition months in terms of ASTM volatility requirements for Southern Arizona, and two classes are assigned to each month. For this

analysis, we selected the worst case value in terms of the impact on CO emissions (i.e., the highest value for each month) as listed below:

- February = 13.5 psi
- March = 11.5 psi

Relaxing the oxygenate requirement was a simple matter of not specifying an oxygenated fuels program in the MOBILE6 files. In its default configuration, MOBILE6 does not include the impacts of oxygenated gasoline.

Finally, relaxation of the remaining CARB Phase 2 gasoline requirements was modeled by increasing the gasoline sulfur level. Current wintertime gasoline is modeled by MAG as having an average and maximum sulfur level of 30 ppm. If the current standards are relaxed, sulfur levels could presumably reach levels reflective of the federal Tier 2 sulfur standards. Thus, the sulfur levels used to model relaxed gasoline standards are the default national sulfur levels in MOBILE6,<sup>\*</sup> which are summarized below:

Calendar Year:	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008+</u>
Average Sulfur (ppm):	92	33	33	30
Maximum Sulfur (ppm):	303	87	87	80

### Analysis of Temperature Data

As noted above, emissions modeling performed for the Maintenance Plan was based on a December design day, and the temperatures used for that analysis may not be reflective of temperatures observed during high-CO days in February and March. Thus, alternative temperatures were developed for February and March for this study.

Two EPA documents were reviewed that provide guidance on establishing appropriate temperatures for CO modeling:

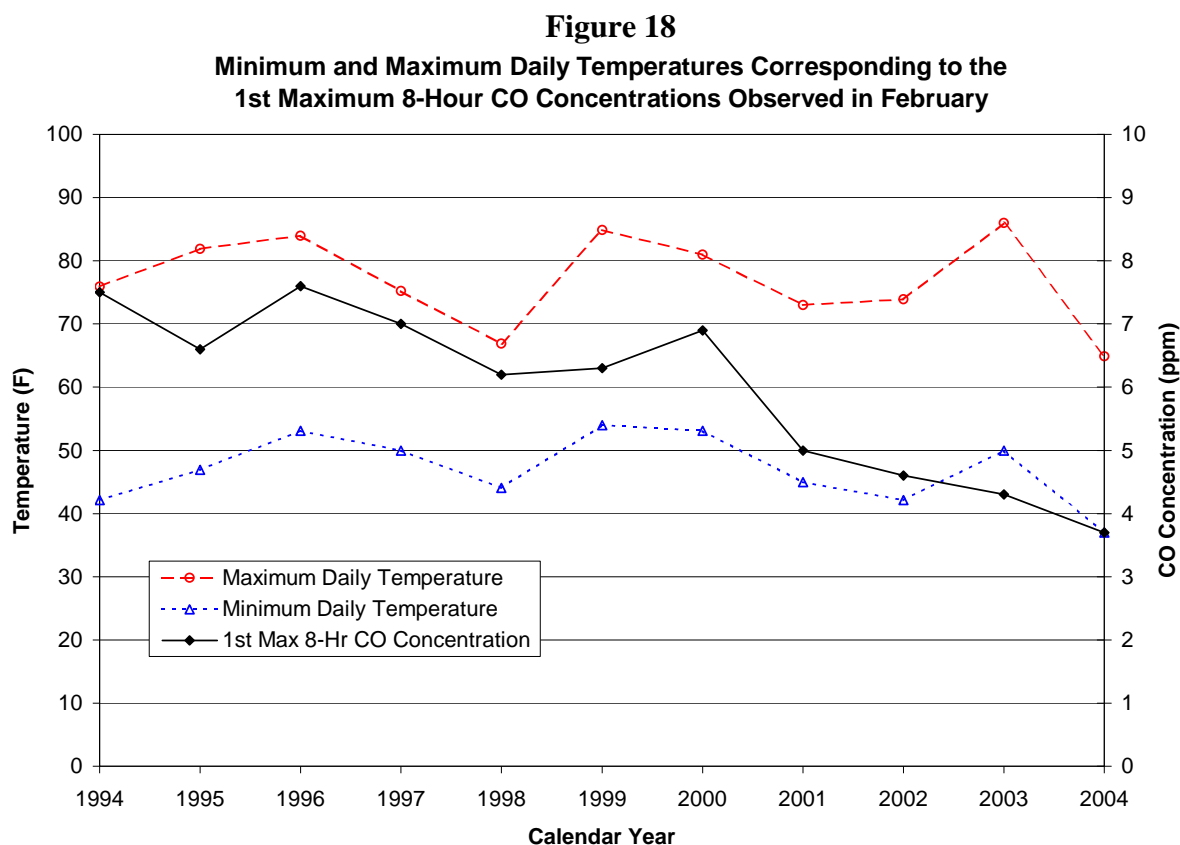
1. MOBILE6 Guidance<sup>8</sup> - This document recommends use of the actual temperatures that occurred during an exceedance if a specific day is being modeled. For more generic modeling (for SIP or conformity purposes), the min/max is established by averaging temperatures for days with the 10 highest CO concentrations over a consecutive three-year period over which the standard was exceeded.
2. EPA Maintenance Guidance<sup>9</sup> - This guidance says that the inventory should be based on “typical CO season day” emissions for the attainment year. It also says that the maintenance demonstration should be based on the same level of modeling as used in the attainment demonstration.

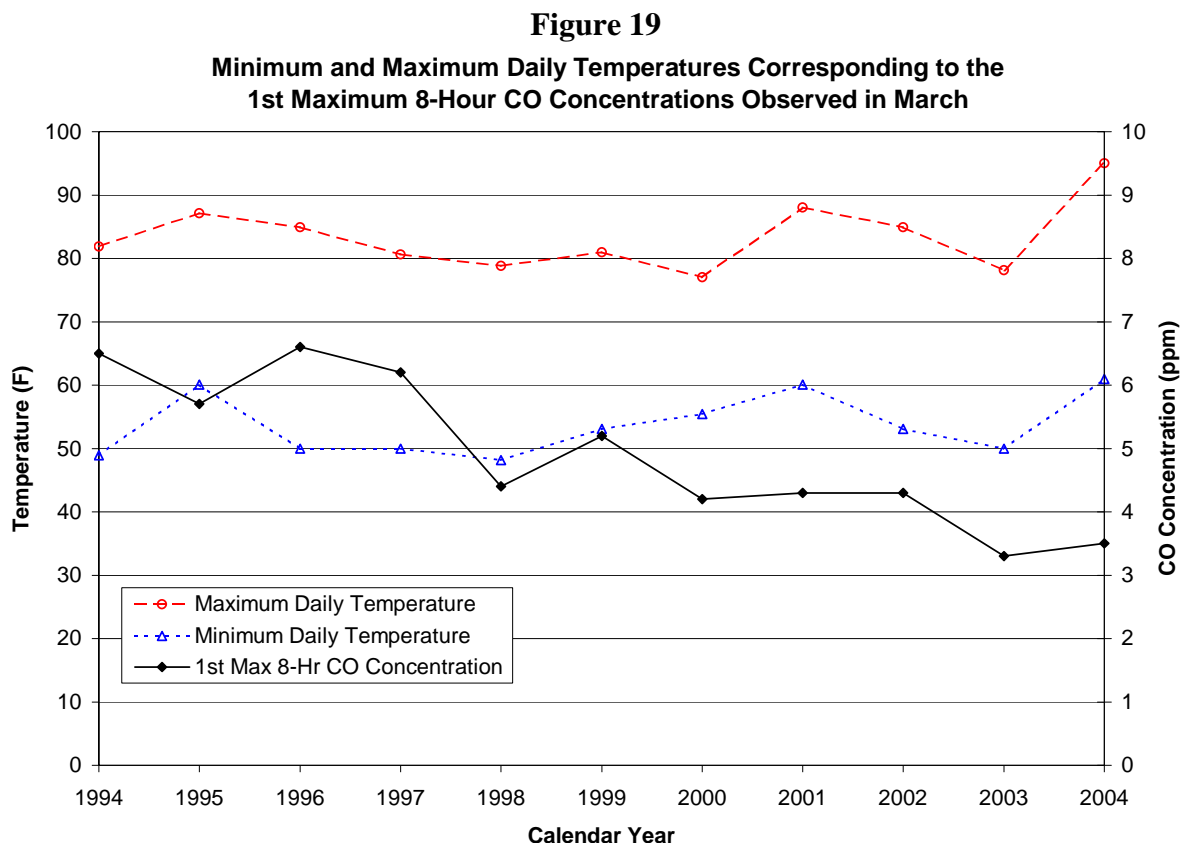
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<sup>\*</sup> Note that Arizona is not part of the Western U.S. Geographic Phase-In Area that received a slight delay in terms of compliance with the Tier 2 sulfur requirements. Thus, the national default sulfur levels in MOBILE6 were used rather than fuel reflective of the Geographic Phase-In Area.

This analysis does not fit neatly into either of these categories because it concerns time periods and events when there were no exceedances of the CO NAAQS. That being the case, temperature data were analyzed in a number of different ways, with the intent of establishing temperature ranges reflective of worst-case CO levels.

Figures 18 and 19 show the minimum and maximum temperatures for the 1st maximum 8-hour CO concentrations observed in February and March, respectively. (Note that the min/max values presented in the figures are actually from the day before the CO maxima, as the time that the highest CO values were recorded was generally between midnight and 3:00 a.m.) As observed in those figures, there is no real trend over time with respect to the minimum and maximum temperatures during the highest CO episodes, although there is a slight downward bias in the February temperatures in recent years, and there is a slight upward bias in the March temperatures in recent years. Thus, average min/max temperatures were calculated for the entire time period (1994 to 2004) and for the four most recent years (2001 to 2004). Those results are summarized in Table 11.





**Table 11**  
**Daily Minimum and Maximum Temperatures Corresponding**  
**to Maximum 8-Hour CO Concentrations in Maricopa County**  
**for February and March**

Month	Time Period/ Basis	Mean Temperatures (°F)	
		Minimum <sup>a</sup>	Maximum <sup>a</sup>
February	1994-2004 / Mean of 1 <sup>st</sup> Max 8-Hr CO	47.0	77.1
	2001-2004 / Mean of 1 <sup>st</sup> Max 8-Hr CO	<b>43.5</b>	<b>74.5</b>
	2002-2004 / Mean of 10 Highest 8-Hr CO	47.5	75.5
March	1994-2004 / Mean of 1 <sup>st</sup> Max 8-Hr CO	53.6	83.4
	2001-2004 / Mean of 1 <sup>st</sup> Max 8-Hr CO	<b>56.1</b>	<b>86.5</b>
	2002-2004 / Mean of 10 Highest 8-Hr CO	53.4	82.7

<sup>a</sup> Values in bold font reflect those used in the modeling performed for this study.

Temperature data were also analyzed from February and March for the 10 highest CO days observed in each month for the last three years (2002 to 2004). This approach is similar to that outlined in item 1 above, although the standard was not exceeded during this time period. The average min/max temperatures for those observations are also presented in Table 11.

The results presented in Table 11 show that the minimum and maximum temperatures calculated using the three methods outlined above are very similar. Given this, the impacts of fuel formulation changes on CO estimates calculated with MOBILE6 are also expected to be similar for the three sets of temperatures. For this study, the mean temperatures corresponding to the first-maximum CO levels occurring over the last four years (2001 to 2004) were selected for use in MOBILE6. That is because those temperatures are likely to be reflective of high CO days over the next several years, and there is more concern about impacts of fuel changes on ambient CO levels in the near-term (i.e., in the next two to three years) than in the long-term when fleet turnover will result in continued reductions in per-vehicle CO emission rates.

### MOBILE6 Emission Factors

Using the inputs described above, a series of MOBILE6 runs were performed for the Phoenix metropolitan area. The model was run for February and March for calendar years 2004, 2005, 2006, 2010, and 2015,<sup>\*</sup> and the results are summarized in Table 12 (February) and Table 13 (March). The 2004 runs were prepared using current gasoline specifications, while the 2005, 2006, 2010, and 2015 runs were performed for four sets of wintertime fuel scenarios:

- Current fuel specifications;
- Relaxed RVP to ASTM standards;
- Relaxed RVP and removal of oxygenate requirements; and
- Relaxed RVP, removal of oxygenate requirements, and relaxation of sulfur to Tier 2 requirements.

The last fuel set above reflects elimination of current wintertime gasoline requirements, and it reflects the analysis requested in the Scope of Work for this project. However, it is interesting to compare the impacts of all fuel scenarios on CO emission rates. As expected, relaxing the current RVP standard in the March runs results in the largest increase in emissions. As discussed in an previous analysis prepared by Sierra,<sup>10</sup> the large impact on CO emissions from RVP increases is very likely overstated by MOBILE6, particularly for newer technology vehicles. Thus, we believe this reflects a worst-case estimate of the increase in CO emissions as a result of increased RVP.

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<sup>\*</sup> Note that the 2006 analysis year was not requested in the draft Scope of Work. However, as that could be the first year during which the gasoline specifications are relaxed, it is worthwhile to include it in this evaluation.

**Table 12**  
**Results of the February MOBILE6 Runs**

**February 2004 MOBILE6 Run (I/M + Non-I/M)**

	Vehicle Type:									
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VTM Distribution:	0.4340	0.3097	0.1180		0.0364	0.0015	0.0020	0.0939	0.0045	1
Baseline CO (g/mi)	9.66	13.38	14.78	13.78	12.12	1.58	2.08	3.19	12.85	10.89

**February 2005 MOBILE6 Runs (I/M + Non-I/M)**

	Vehicle Type:										Increase from Baseline
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VTM Distribution:	0.4209	0.3189	0.1215		0.0364	0.0014	0.0021	0.0944	0.0045	1	
Baseline CO (g/mi)	9.16	12.20	13.92	12.67	11.01	1.55	1.66	3.09	12.85	10.19	
Relax RVP (g/mi)	12.08	15.95	18.45	16.65	12.69	1.55	1.66	3.09	12.85	13.23	30%
Relax RVP+Oxy (g/mi)	13.20	18.21	21.20	19.04	17.16	1.55	1.66	3.09	16.71	14.94	47%
Relax RVP+Oxy+Sulfur (g/mi)	15.06	20.09	22.46	20.74	17.61	1.55	1.66	3.09	16.71	16.49	62%

**February 2006 MOBILE6 Runs (I/M + Non-I/M)**

	Vehicle Type:										Increase from Baseline
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VTM Distribution:	0.4075	0.3285	0.1251		0.0363	0.0013	0.0022	0.0947	0.0044	1	
Baseline CO (g/mi)	8.73	11.44	13.14	11.91	10.04	1.52	1.60	3.01	12.85	9.67	
Relax RVP (g/mi)	11.52	14.97	17.45	15.66	11.77	1.52	1.60	3.01	12.85	12.57	30%
Relax RVP+Oxy (g/mi)	12.53	17.03	19.92	17.82	15.72	1.52	1.60	3.01	16.71	14.12	46%
Relax RVP+Oxy+Sulfur (g/mi)	12.68	17.17	20.01	17.95	15.80	1.52	1.60	3.01	16.71	14.24	47%

**February 2010 MOBILE6 Runs (I/M + Non-I/M)**

	Vehicle Type:										Increase from Baseline
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VTM Distribution:	0.3532	0.3677	0.1399		0.0366	0.0008	0.0021	0.0955	0.0042	1	
Baseline CO (g/mi)	7.06	9.10	10.10	9.37	7.71	1.07	0.74	1.84	12.85	7.76	
Relax RVP (g/mi)	9.34	12.01	13.54	12.43	9.63	1.07	0.74	1.84	12.85	10.19	31%
Relax RVP+Oxy (g/mi)	9.97	13.21	14.97	13.70	11.87	1.07	0.74	1.84	16.71	11.16	44%
Relax RVP+Oxy+Sulfur (g/mi)	10.27	13.46	15.20	13.94	11.87	1.07	0.74	1.84	16.71	11.39	47%

**February 2015 MOBILE6 Runs (I/M + Non-I/M)**

	Vehicle Type:										Increase from Baseline
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VTM Distribution:	0.3063	0.4012	0.1526		0.0367	0.0006	0.0023	0.0962	0.0041	1	
Baseline CO (g/mi)	5.81	7.13	7.96	7.36	6.90	0.84	0.55	0.82	12.85	6.24	
Relax RVP (g/mi)	7.58	9.36	10.65	9.71	8.62	0.84	0.55	0.82	12.85	8.15	31%
Relax RVP+Oxy (g/mi)	8.02	9.99	11.45	10.39	10.15	0.84	0.55	0.82	16.71	8.73	40%
Relax RVP+Oxy+Sulfur (g/mi)	8.47	10.32	11.76	10.71	10.15	0.84	0.55	0.82	16.71	9.05	45%

**Table 13**  
**Results of the March MOBILE6 Runs**

**March 2004 MOBILE6 Run (I/M + Non-I/M)**

	Vehicle Type:									
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VTM Distribution:	0.4340	0.3097	0.1180		0.0364	0.0015	0.0020	0.0939	0.0045	1
Baseline CO (g/mi)	8.78	11.94	13.49	12.36	12.67	1.58	2.08	3.19	13.78	9.93

**March 2005 MOBILE6 Runs (I/M + Non-I/M)**

	Vehicle Type:										Increase from Baseline
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VTM Distribution:	0.4209	0.3189	0.1215		0.0364	0.0014	0.0021	0.0944	0.0045	1	
Baseline CO (g/mi)	8.20	10.83	12.64	11.32	11.44	1.55	1.66	3.09	13.78	9.22	
Relax RVP (g/mi)	12.82	16.22	19.14	17.01	13.65	1.55	1.66	3.09	13.78	13.75	49%
Relax RVP+Oxy (g/mi)	13.97	18.53	21.95	19.47	18.46	1.55	1.66	3.09	17.92	15.51	68%
Relax RVP+Oxy+Sulfur (g/mi)	16.03	20.48	23.41	21.29	18.93	1.55	1.66	3.09	17.92	17.19	86%

**March 2006 MOBILE6 Runs (I/M + Non-I/M)**

	Vehicle Type:										Increase from Baseline
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VTM Distribution:	0.4075	0.3285	0.1251		0.0363	0.0013	0.0022	0.0947	0.0044	1	
Baseline CO (g/mi)	7.78	10.11	11.87	10.60	10.36	1.52	1.60	3.01	13.78	8.70	
Relax RVP (g/mi)	12.18	15.19	18.06	15.99	12.64	1.52	1.60	3.01	13.78	13.02	50%
Relax RVP+Oxy (g/mi)	13.22	17.30	20.60	18.21	16.87	1.52	1.60	3.01	17.92	14.63	68%
Relax RVP+Oxy+Sulfur (g/mi)	13.37	17.43	20.70	18.34	16.95	1.52	1.60	3.01	17.92	14.75	69%

**March 2010 MOBILE6 Runs (I/M + Non-I/M)**

	Vehicle Type:										Increase from Baseline
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VTM Distribution:	0.3532	0.3677	0.1399		0.0366	0.0008	0.0021	0.0955	0.0042	1	
Baseline CO (g/mi)	6.14	7.82	8.88	8.11	7.74	1.07	0.74	1.84	13.78	6.80	
Relax RVP (g/mi)	9.73	12.12	13.98	12.63	10.26	1.07	0.74	1.84	13.78	10.46	54%
Relax RVP+Oxy (g/mi)	10.41	13.37	15.48	13.95	12.65	1.07	0.74	1.84	17.92	11.47	69%
Relax RVP+Oxy+Sulfur (g/mi)	10.67	13.60	15.70	14.18	12.65	1.07	0.74	1.84	17.92	11.68	72%

**March 2015 MOBILE6 Runs (I/M + Non-I/M)**

	Vehicle Type:										Increase from Baseline
	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VTM Distribution:	0.3063	0.4012	0.1526		0.0367	0.0006	0.0023	0.0962	0.0041	1	
Baseline CO (g/mi)	4.81	6.01	6.91	6.25	6.93	0.84	0.55	0.82	13.78	5.33	
Relax RVP (g/mi)	7.54	9.33	10.89	9.76	9.18	0.84	0.55	0.82	13.78	8.19	54%
Relax RVP+Oxy (g/mi)	8.02	9.98	11.75	10.47	10.82	0.84	0.55	0.82	17.92	8.80	65%
Relax RVP+Oxy+Sulfur (g/mi)	8.42	10.30	12.05	10.78	10.82	0.84	0.55	0.82	17.92	9.10	71%

## VTM Estimates

The CO emissions inventory prepared for the Maintenance Plan was based on combining VMT from a travel demand model and g/mi emission factors from MOBILE6 on a link-level basis. Much of the reason for taking that approach is because a gridded inventory was needed for subsequent airshed modeling. That level of detail was beyond the scope of the current study, and for this analysis, we simply combined the emission rates summarized above with VMT estimates that were provided by MAG and developed for the 2003 MAG Conformity Analysis. A summary of those VMT estimates is contained in Table 14, which shows the daily VMT for the CO modeling area. Estimates for 2004 and 2005 were made based on backcasting from the 2006 values in the table and the annual VMT growth rate observed between 2006 and 2015 (i.e., 2.2%). The 2010 estimate was also based on a 2.2% annual growth rate in VMT.

<b>Table 14</b> <b>Regional VMT Used in the 2003 MAG Conformity Analysis</b> <b>(Daily VMT for the CO Modeling Area)</b>	
Calendar Year	Daily VMT
2006	61,118,000
2015	74,449,000
2016	75,651,000
2026	86,173,000

The resulting daily VMT estimates used to generate the inventories for this effort are:

- Calendar Year 2004 = 58,496,000
- Calendar Year 2005 = 59,793,000
- Calendar Year 2006 = 61,118,000
- Calendar Year 2010 = 66,720,000
- Calendar Year 2015 = 74,449,000

### On-Road Inventory Estimates

On-road motor vehicle CO emissions inventories were prepared using the emission factors and VMT estimates presented above, and the results are summarized in Table 15 for the current fuel regulations and for a relaxation of RVP, oxygenate, and sulfur requirements. Those results show a fairly dramatic increase in fleet CO emissions as a result of relaxing wintertime gasoline regulations. However, as discussed in the next section of the report, ambient CO levels observed in Maricopa County over the last several years in February and March have been so low that increases in motor vehicle CO emissions of this magnitude would not likely cause an exceedance of the CO standard.

<b>Table 15</b> <b>On-Road Motor Vehicle CO Emissions Inventory Estimates</b> <b>for the Phoenix Metropolitan Area</b> <b>(Metric Tons per Day)</b>						
Month	Fuel Scenario	Calendar Year				
		2004	2005	2006	2010	2015
February	Current	636.8	609.4	591.0	518.1	464.7
	Relaxed	--	985.8	870.5	759.7	673.7
March	Current	580.7	551.0	532.0	454.0	396.7
	Relaxed	--	1027.5	901.5	779.6	677.8



## Impact of Gasoline Specification Changes on Nonroad Inventory Estimates

As noted above, relaxation of the wintertime oxygenate requirement will impact CO emissions from nonroad engines and vehicles. Many of these engines typically run “rich” (i.e., more fuel is introduced into the combustion chamber than needed for a balanced air/fuel mixture), which results in incomplete combustion and elevated HC and CO levels. Adding oxygen to the fuel helps to complete the combustion process and will reduce CO emissions from engines that are not equipped with the sophisticated fuel management systems that are on current automobiles. Thus, elimination of the oxygenate requirement will result in an increase in CO emissions from nonroad engines and vehicles. (Although sulfur and RVP impact CO emissions from on-road vehicles, the impact on CO from nonroad equipment is expected to be much less, as catalyst technology, when employed, is much less advanced, and nonroad equipment is not equipped with evaporative canisters, which is the source of elevated CO with increasing RVP in on-highway vehicles.)

To investigate the magnitude of the impact of eliminating the oxygenate requirement on nonroad CO emissions, Sierra generated inventory estimates for Maricopa County using EPA’s NONROAD2004 model.\* The model was run for calendar years 2004, 2005, 2010, and 2015 under the two fuel scenarios summarized in Table 16. Note that the sulfur levels under the relaxed requirements match national average values contained in MOBILE6.2 and reflect implementation of the Tier 2 program. The RVP level under the relaxed standards reflects the ASTM maximum for February.

The results of the NONROAD model runs (in tons per winter day) are summarized in Table 17, which shows a constant 28% increase in CO emissions for all calendar years as a result of relaxing wintertime gasoline specifications in Maricopa County. This impact will be addressed in the roll-forward analysis presented in the next section of the report.

<b>Table 16</b>				
<b>Gasoline Parameters Used in the NONROAD Model Runs</b>				
Fuel Scenario	Gasoline Parameter	Calendar Year		
		2004	2005	2010/15
Baseline	RVP (psi)	9.0	9.0	9.0
	Oxygen (wt%)	3.5	3.5	3.5
	Sulfur (ppm)	30	30	30
Relaxed Standards	RVP (psi)	13.5	13.5	13.5
	Oxygen (wt%)	0	0	0
	Sulfur (ppm)	121	92	30

\* The NONROAD model and associated materials are available at <http://www.epa.gov/otaq/nonrdmdl.htm>.

<b>Table 17</b> <b>Impact of Relaxing Wintertime Gasoline Standards</b> <b>on CO Emissions from Gasoline-Fueled Nonroad Equipment</b> <b>in Maricopa County Based on EPA's NONROAD Model</b>			
Calendar Year	CO Emissions (tpd)		Percent Increase
	Baseline Fuel	Relaxed Fuel Standards	
2004	309.5	397.4	28%
2005	318.6	409.0	28%
2010	346.9	445.3	28%
2015	378.5	486.0	28%

## 5. CARBON MONOXIDE ROLL-FORWARD ANALYSIS

This section of the report presents the results of the “roll-forward” analysis that was conducted to estimate the impact of changes in fuel specifications on maximum eight-hour ambient CO concentrations in the Phoenix metropolitan area. This analysis was performed for February and March assuming that the CARB RFG, wintertime oxygenate, and wintertime RVP requirements were lifted. Estimates were prepared that included all CO emissions sources as well as just on-highway motor vehicles. The estimates that assumed on-highway vehicles were the only source of CO investigated the impacts of relaxing the fuel regulations in 2005 as well as 2006. In addition, the impacts of varying VMT growth rates were also evaluated.

### Methodology

A “roll-forward” analysis is a simple calculation that assumes that changes in ambient concentrations of a pollutant are directly proportional to changes in the emissions inventory for that pollutant. As a result, a base year is established in which both ambient data are available and emissions inventory estimates are available (or can be constructed). Once the base year is established, future year ambient CO concentrations are estimated as follows:

$$\text{AMB CO}_{\text{FY}} = \text{AMB CO}_{\text{BY}} \times (\text{INV CO}_{\text{FY}} / \text{INV CO}_{\text{BY}})$$

where,

$$\begin{aligned} \text{AMB CO}_{\text{FY}} &= \text{ambient CO concentration in future year (ppm);} \\ \text{AMB CO}_{\text{BY}} &= \text{ambient CO concentration in base year (ppm);} \\ \text{INV CO}_{\text{FY}} &= \text{CO inventory in future year (tons per day); and} \\ \text{INV CO}_{\text{BY}} &= \text{CO inventory in base year (tons per day).} \end{aligned}$$

One nuance associated with this methodology is that an adjustment is often applied to account for the effect of background concentrations (i.e., from emissions not produced or controlled within the area of interest). If a background concentration is accounted for in the calculation, it is subtracted from the base-year ambient concentration in the equation above prior to calculating the future-year concentration. It is then added to the calculated future year concentration after the above calculation is performed, i.e.,

$$\text{AMB CO}_{\text{FY}} = (\text{AMB CO}_{\text{BY}} - \text{BG}) \times (\text{INV CO}_{\text{FY}} / \text{INV CO}_{\text{BY}}) + \text{BG}$$

where BG represents the background concentration of CO in the area. Thus, the background concentration is assumed to remain constant, and the impact of changes in future-year inventories on estimated future-year CO concentrations is reduced. For this analysis, the most conservative approach (i.e., worst-case in terms of the impact that relaxation of gasoline standards would have on increased ambient CO concentrations) would be to assume a background concentration of zero, and that was the approach used in the ensuing roll-forward analyses.

### Roll-Forward Analysis Accounting for All CO Sources

The first set of roll-forward calculations performed for this study accounted for all sources in the CO inventory estimates (i.e., point, area, nonroad equipment, and on-road vehicles). The on-road motor vehicle emissions used in this analysis were extracted from Table 15 of this report, while the point, area, and nonroad inventories are those developed for the Maintenance Plan (see Table VII-6 of Reference 1), with the years used in this analysis based on interpolating the estimates provided in the Maintenance Plan. To account for the impact of gasoline changes on CO from nonroad equipment, the nonroad inventory was increased by 28% based on the analysis presented in Section 4 of this report. The resulting inventories, for both the baseline fuel scenario and under the relaxed fuel scenario, are shown in Table 18 for the February evaluation and in Table 19 for the March evaluation.

<b>Table 18</b> <b>Estimated CO Emissions Inventory and CO Concentrations for February</b> <b>Based on a Roll-Forward Analysis with All Emission Sources</b> <b>(Metric Tons Per Day)</b>					
Fuel Scenario	Source	Calendar Year			
		2004	2005	2010	2015
Baseline Fuel Standards	Point	17.1	18.7	25.3	31.1
	Area	27.5	28.3	31.9	35.5
	Non-Road	159.5	160.0	164.0	168.9
	On-Road	636.8	609.4	518.1	464.7
	Total	840.9	816.3	739.2	700.1
Relaxed Fuel Standards	Point	17.1	18.7	25.3	31.1
	Area	27.5	28.3	31.9	35.5
	Non-Road	159.5	204.8	209.9	216.2
	On-Road	636.8	985.8	759.7	673.7
	Total	840.9	1237.5	1026.8	956.4
Maximum 8-Hour CO Concentration (ppm):	Baseline	3.7	3.6	3.3	3.1
	Relaxed		5.4	4.5	4.2

<b>Table 19</b> <b>Estimated CO Emissions Inventory and CO Concentrations for March</b> <b>Based on a Roll-Forward Analysis with All Emission Sources</b> <b>(Metric Tons Per Day)</b>					
Fuel Scenario	Source	Calendar Year			
		2004	2005	2010	2015
Baseline Fuel Standards	Point	17.1	18.7	25.3	31.1
	Area	27.5	28.3	31.9	35.5
	Non-Road	159.5	160.0	164.0	168.9
	On-Road	580.7	551.0	454.0	396.7
	Total	784.8	758.0	675.2	632.2
Relaxed Fuel Standards	Point	17.1	18.7	25.3	31.1
	Area	27.5	28.3	31.9	35.5
	Non-Road	159.5	204.8	209.9	216.2
	On-Road	580.7	1027.5	779.6	677.8
	Total	784.8	1279.3	1046.7	960.5
Maximum 8-Hour CO Concentration (ppm):	Baseline	3.5	3.4	3.0	2.8
	Relaxed		5.7	4.7	4.3

Also shown in Tables 18 and 19 are the estimated maximum 8-hour CO concentrations for the baseline fuel case and for the relaxed fuel parameter case. For this analysis, the most recently available ambient data for the Phoenix metropolitan area presented in Section 3 of this report were used to establish the base year maximum 8-hour CO concentrations from which future year concentrations were forecast (i.e., data from February and March 2004 served as the base year ambient concentrations for this analysis). Based on Table 6, the maximum 8-hour concentration observed in February 2004 was 3.7 ppm and the maximum 8-hour concentration observed in March 2004 was 3.5 ppm.

As observed in Tables 18 and 19, the results of the roll-forward analysis indicate that while a substantial increase in maximum ambient CO levels is estimated as a result of relaxing the gasoline specifications (particularly in 2005), the resulting CO concentrations are still well below the NAAQS for CO (i.e., 9 ppm).

## Roll-Forward Analysis Assuming On-Highway Vehicles are the Only Source of CO

Because CO is typically a very localized pollutant, and because the primary source of CO in urban areas is on-highway motor vehicles, a second set of roll-forward calculations were generated in which it was assumed that on-highway motor vehicles were the only source of CO at the monitoring sites recording the highest CO levels in the Phoenix metropolitan area. This reflects a worst-case scenario, as relaxation of gasoline specifications has the largest impact on on-highway vehicles.

For this analysis, results from the MOBILE6 runs described in the previous section of this report were combined with a 3% VMT annual growth rate to forecast emissions (and CO concentrations) from the 2004 base year. A 3% growth rate was used, as that was the maximum annual growth rate between 2006 and 2015 observed in the VMT estimates prepared for the 2003 MAG Conformity Analysis. The results of this analysis are shown graphically in Figure 20 for the February analysis and in Figure 21 for the March analysis. Each figure shows the results for relaxing the fuel specifications in February 2005 as well as February 2006. Under the latter scenario, the impact is not as great because fleet emissions as a whole are reduced between 2005 and 2006, and the federal Tier 2 sulfur regulations (which would be effective under the relaxed fuel specification scenarios) are one year closer to full implementation. Figures 20 and 21 both show that the estimated increases in maximum 8-hour ambient CO concentrations are not enough to cause a violation of the standard.

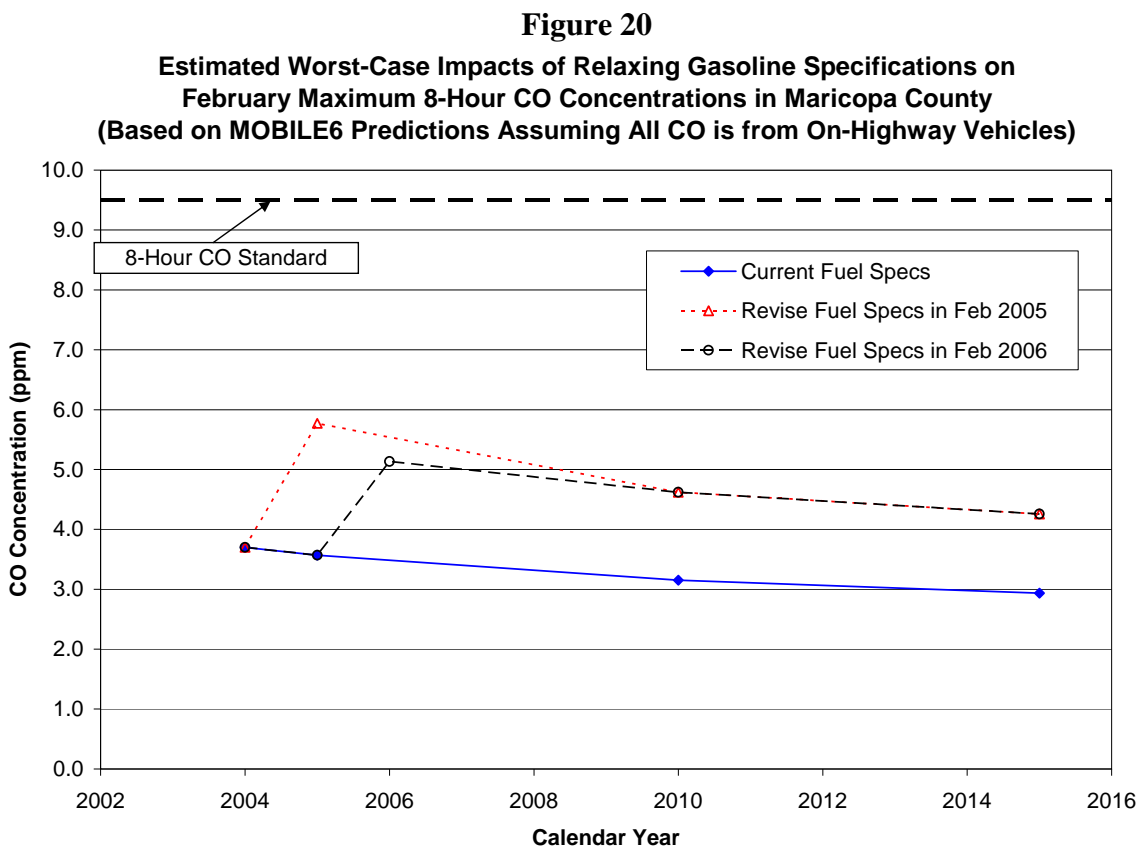
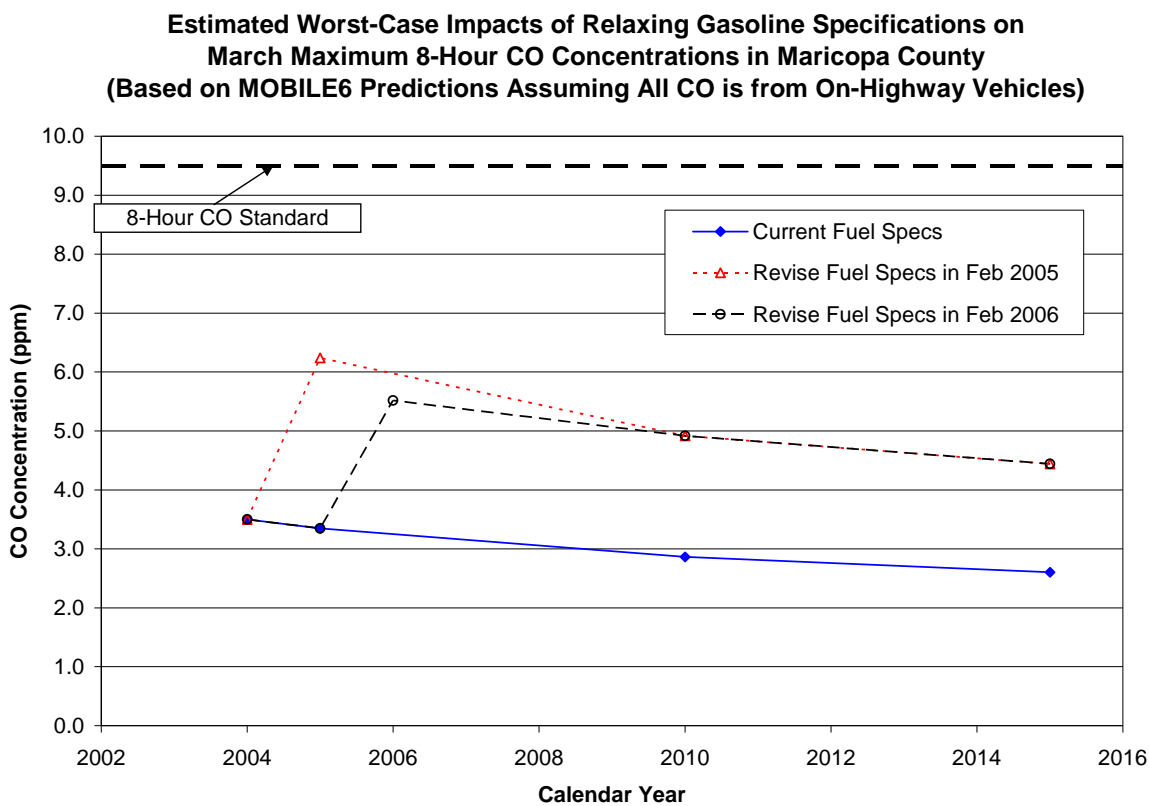


Figure 21

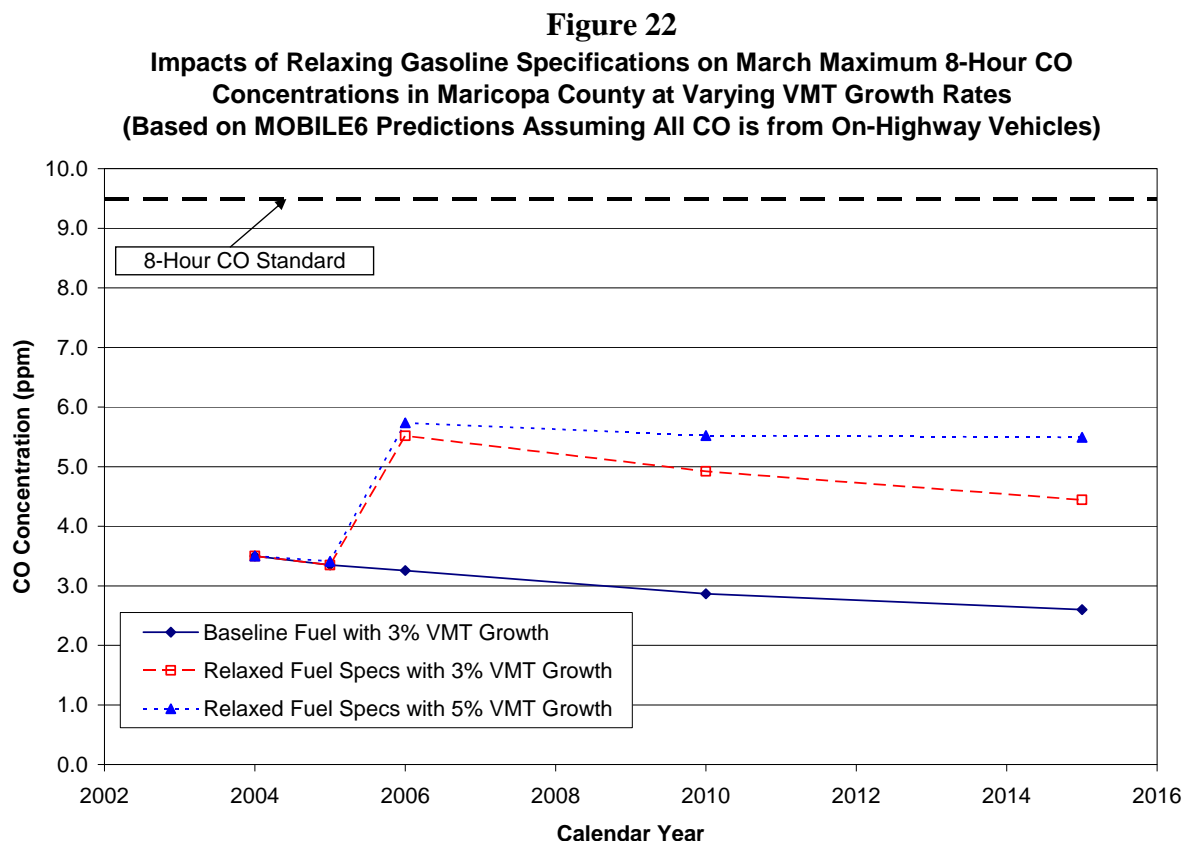


### Impact of Higher VMT Growth Rates on Estimated CO Concentrations

A final analysis performed for this study was an evaluation of the impact that higher-than-average VMT growth rates might have on estimated CO concentrations. As noted above, CO is a localized pollutant, and if VMT growth near a monitoring site is higher than for the area as a whole, the impact of fuel specification changes on CO concentrations at that site would be expected to be greater.

For this analysis, two annual VMT growth rates were investigated: 3% (approximately the current areawide VMT growth) and 5%. To put these numbers in perspective, a 3% annual growth rate reflects a 38% increase in travel between the 2004 base year and 2015, and a 5% growth rate reflects a 71% increase in travel between 2004 and 2015.

The results of this analysis for the month of March are presented in Figure 22. March was selected for this evaluation because the impacts of gasoline specification changes had a greater impact on CO emissions and projected CO concentrations in the March analysis than in the February analysis. In addition, this figure assumes that the gasoline specification changes would go into effect in 2006. As observed in the figure, even with a 5% annual VMT growth rate, relaxation of the Maricopa County gasoline specifications in February and March is not expected to result in an exceedance of the ambient CO standard.



As noted previously, the monitors recording the highest CO levels in the Phoenix area include:

- Monitor #0016 - 3315 W. Indian School Rd, Phoenix;
- Monitor #0019 - 3847 W. Earll Dr-West Phoenix Station, Phoenix; and
- Monitor #3010 - 1128 N. 27th Ave - Greenwood Station, Phoenix.

Based on projections developed by MAG, the annual VMT growth rates between 2006 and 2015 in the vicinity of these monitors are well below the regional average of 3% per year.<sup>11</sup> VMT in the vicinity of Monitor #0016 is estimated to increase by 1.2% per year, VMT near Monitor #0019 is estimated to increase by 0.2% per year, and the increase in VMT near Monitor #3010 is projected to be about 2% per year. Thus, higher-than-average VMT growth is not expected to be an issue with respect to the impacts of motor vehicle emissions on ambient CO levels recorded at these locations. This result is not unexpected, as those monitors are located in developed urban areas where adjacent streets and freeways are already operating at or near capacity.



## 6. REFERENCES

- 
1. "Carbon Monoxide Redesignation Request and Maintenance Plan for the Maricopa County Nonattainment Area," Maricopa Association of Governments, May 2003.
  2. "Technology Transfer Network Air Quality System - Download Detailed AQS Data," U.S. Environmental Protection Agency, data available at <http://www.epa.gov/ttn/airs/airsaqs/detaildata/downloadaqsdta.htm>.
  3. Personal communication. Virginia Ambrose, U.S. Environmental Protection Agency, October 26, 2004.
  4. Personal communication. Sandra Wardwell, Arizona Department of Environmental Quality, October 20, 2004.
  5. "Air Quality System Raw Data Summarization Formulas (Draft)," Version 1.1, U.S. Environmental Protection Agency, April 12, 2004.
  6. "GUIDELINE SERIES: Guidelines for the Interpretation of Air Quality Standards," U.S. Environmental Protection Agency, OAQPS NO. 1.2-008, February 1977.
  7. "Standard Specification for Automotive Spark-Ignition Fuel," ASTM Standard D 4814-01a, ASTM International, November 2001.
  8. "Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation," U.S. Environmental Protection Agency, January 2002.
  9. "Procedures for Processing Requests to Redesignate Areas to Attainment," Memorandum from John Calcagni (Director, Air Quality Management Division) to Regional Directors, U.S. Environmental Protection Agency, September 4, 1992.
  10. "Review of Current and Future CO Emissions from On-Road Vehicles in Selected Western Areas," Prepared by Sierra Research for the Western States Petroleum Association, Report No. SR03-01-01, January 28, 2003.
  11. Personal communication. Roger Roy, Maricopa Association of Governments, January 19, 2005.

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# **Appendix D**

## **State Implementation Plan Revision Public Comment and Hearing Documentation**

**(To Be Added After Hearing)**

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# **Appendix E**

**Arizona Administrative Code  
R20-2-701 through R20-2-760**

**TITLE 20. COMMERCE, BANKING, AND INSURANCE****CHAPTER 2. DEPARTMENT OF WEIGHTS AND MEASURES**

Authority: A.R.S. § 41-2065(A)(4) et seq.

*Editor's Note: Because the exempt rules in this Chapter were adopted as permanent rules (Supp. 98-3), the Chapter is printed on white paper (99-3).*

*Editor's Note: Sections of this Chapter were adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules. Because these rules are exempt from the regular rulemaking process, the Chapter is printed on blue paper (Supp. 97-3).*

*Editor's Note: When recodified (Supp. 95-1), not all of the former rule citations were revised to reference the new Title and Chapter. Citations referencing the former title (A.A.C. Title 4, Chapter 31) have been corrected to 20 A.A.C. 2 throughout these rules. For specific revisions, refer to the Section historical notes (Supp. 97-2).*

20 A.A.C. 2, consisting of R20-2-101 through R20-2-117, R20-2-201 through R20-2-205, R20-3-301 through R20-3-313, R20-2-401 through R20-2-412, R20-2-501 through R20-2-505, R20-2-601 through R20-2-604, R20-2-701 through R20-2-721, R20-2-801 through R20-2-812, and R20-2-901 through R20-2-909, recodified from 4 A.A.C. 31, consisting of R4-31-101 through R4-31-117, R4-31-201 through R4-31-205, R4-31-301 through R4-31-313, R4-31-401 through R4-31-412, R4-31-501 through R4-31-505, R4-31-601 through R4-31-604, R4-31-701 through R4-31-721, R4-31-801 through R4-31-812, and R4-31-901 through R4-31-909 pursuant to R1-1-102 (Supp. 95-1).

Laws 1987, Ch. 314, § 3, changed the heading from State Administration of Weights and Measures to the Department of Weights and Measures effective August 18, 1987.

Laws 1983, Ch. 98, 199, changed the heading from State Weights and Measures Division to State Administration of Weights and Measures; 202, transferred authority for administration to the Director of Administration effective July 27, 1983.

Article 1 consisting of Sections R4-31-101 through R4-31-113, Article 2 consisting of Sections R4-31-201 through R4-31-205, Article 3 consisting of Sections R4-31-301 through R4-31-313, Article 4 consisting of Sections R4-31-401 through R4-31-412, Article 5 consisting of Sections R4-31-501 through R4-31-505, Article 6 consisting of Sections R4-31-601 through R4-31-604 adopted effective July 27, 1983.

Former Sections R4-31-101 through R4-31-113, R4-31-201 through R4-31-205, R4-31-301 through R4-31-313, R4-31-401 through R4-31-412, R4-31-501 through R4-31-505, R4-31-601 through R4-31-604 adopted again with conforming changes. R20-2-101 through R20-2-113, R20-2-201 through R20-2-205, R20-2-301 through R20-2-313, R20-2-401 through R20-2-412, R20-2-501 through R20-2-505, R20-2-601 through R20-2-604 recodified from R4-31-101 through R4-31-113, R4-31-201 through R4-31-205, R4-31-301 through R4-31-313, R4-31-401 through R4-31-412, R4-31-501 through R4-31-505, R4-31-601 through R4-31-604 (Supp. 95-1).

**ARTICLE 1. ADMINISTRATION AND PROCEDURES**

## Section

R20-2-101.	Definitions
R20-2-102.	Metrology Laboratory Testing and Calibration Fees
R20-2-103.	Licensing and Fees
R20-2-104.	Administrative Enforcement Action
R20-2-105.	Repealed
R20-2-106.	Repealed
R20-2-107.	Repealed
R20-2-108.	Time-frames for Licenses, Renewals, and Authorities to Construct
R20-2-109.	Administrative Hearing Procedures
R20-2-110.	Motion for Rehearing or Review
R20-2-111.	Repealed
R20-2-112.	Repealed
R20-2-113.	Renumbered
R20-2-114.	Repealed
R20-2-114.	Repealed
R20-2-115.	Renumbered
R20-2-116.	Renumbered
R20-2-117.	Renumbered
Table 1.	Time-frames

**ARTICLE 2. COMMERCIAL DEVICES**

## Section

R20-2-201.	Licensing Process
R20-2-202.	Repealed
R20-2-203.	Approval, Installation, and Sale of Devices
R20-2-204.	Livestock and Vehicle Scale Installation
R20-2-205.	Taxi Cab License Display

**ARTICLE 3. PACKAGING, LABELING, AND METHOD OF SALE**

## Section

R20-2-301.	Repealed
R20-2-302.	Handbook 130 and Handbook 133
R20-2-303.	Repealed
R20-2-304.	Repealed
R20-2-305.	Repealed
R20-2-306.	Repealed
R20-2-307.	Repealed
R20-2-308.	Repealed
R20-2-309.	Repealed
R20-2-310.	Repealed
R20-2-311.	Repealed
R20-2-312.	Repealed
R20-2-313.	Repealed

**ARTICLE 4. PRICE VERIFICATION AND PRICE POSTING**

Article 4, consisting of Sections R20-2-401 through R20-2-412 repealed effective October 8, 1998 (Supp. 98-4).

## Section

R20-2-401.	Repealed
R20-2-402.	Price-posting Inspection Procedure and Violation Exceptions
R20-2-403.	Repealed
R20-2-404.	Repealed
R20-2-405.	Repealed
R20-2-406.	Repealed
R20-2-407.	Repealed
R20-2-408.	Repealed

R20-2-409. Repealed  
 R20-2-410. Repealed  
 R20-2-411. Repealed  
 R20-2-412. Repealed

## ARTICLE 5. PUBLIC WEIGHMASTERS

### Section

R20-2-501. Qualifications; License and Renewal Application Process  
 R20-2-502. Duties  
 R20-2-503. Grounds for Denying License or Renewal; and Disciplinary Action  
 R20-2-504. Scales and Vehicle Weighing  
 R20-2-505. Weight Certificates  
 R20-2-506. Seal of Authority  
 R20-2-507. Prohibited Acts

## ARTICLE 6. REGISTERED SERVICE AGENCIES AND REPRESENTATIVES

### Section

R20-2-601. Qualifications; License and Renewal Application Process  
 R20-2-602. Duties  
 R20-2-603. Grounds for Denying License or Renewal; Disciplinary Action; and Certification of Standards and Testing Equipment  
 R20-2-604. Prohibited Acts  
 R20-2-605. Material Incorporated by Reference

## ARTICLE 7. MOTOR FUELS AND PETROLEUM PRODUCTS

*R20-2-204 and R20-2-205 and R20-2-701, R20-2-703 through R20-2-716 and R20-2-718 through R20-2-721 recodified from R4-31-204 and R4-31-205 and R4-31-701, R4-31-703 through R4-31-716, and R4-31-718 through R4-31-721 (Supp. 95-1).*

*Sections R4-31-204 and R4-31-205 renumbered without change as Sections R4-31-701, R4-31-703 through R4-31-716, and R4-31-718 through R4-31-721 (Supp. 89-1).*

### Section

R20-2-701. Definitions  
 R20-2-702. Material Incorporated by Reference  
 R20-2-703. Volumetric Inspection of Motor Fuels and Motor Fuel Dispensers  
 R20-2-704. Price and Grade Posting on External Signs  
 R20-2-705. Price, Octane, and Lead Substitute Notification on Dispensers  
 R20-2-706. Unattended Retail Dispensers  
 R20-2-707. Product Transfer Documentation and Record Retention for Motor Fuel other than Arizona CBG and AZRBOB  
 R20-2-708. Oxygenated Fuel Blends  
 R20-2-709. Retail Oxygenated Fuel Labeling  
 R20-2-710. Blending Requirements  
 R20-2-711. Alcohol-oxygenated Gasoline Storage Tank Requirements  
 R20-2-712. Water in Service Station Motor Fuel Storage Tanks  
 R20-2-713. Motor Fuel Storage Tank Labeling  
 R20-2-714. Requirements for Motor Fuels Outside the CBG-covered Area  
 R20-2-715. Motor Fuel Quality Testing Methods and Requirements  
 R20-2-716. Sampling and Access to Records  
 R20-2-717. Hold-open Latch Exception  
 R20-2-718. Requirements for the Production or Sale of E85  
 R20-2-719. Requirements for the Sale of Biodiesel

R20-2-720. Renumbered  
 R20-2-721. Renumbered  
 R20-2-722. Reserved  
 R20-2-723. Reserved  
 R20-2-724. Reserved  
 R20-2-725. Reserved  
 R20-2-726. Reserved  
 R20-2-727. Reserved  
 R20-2-728. Reserved  
 R20-2-729. Reserved  
 R20-2-730. Reserved  
 R20-2-731. Reserved  
 R20-2-732. Reserved  
 R20-2-733. Reserved  
 R20-2-734. Reserved  
 R20-2-735. Reserved  
 R20-2-736. Reserved  
 R20-2-737. Reserved  
 R20-2-738. Reserved  
 R20-2-739. Reserved  
 R20-2-740. Reserved  
 R20-2-741. Reserved  
 R20-2-742. Reserved  
 R20-2-743. Reserved  
 R20-2-744. Reserved  
 R20-2-745. Reserved  
 R20-2-746. Reserved  
 R20-2-747. Reserved  
 R20-2-748. Reserved  
 R20-2-749. Reserved  
 R20-2-750. Registration Relating to Arizona CBG or AZRBOB  
 R20-2-751. Arizona CBG Requirements  
 R20-2-751.01. Repealed  
 R20-2-752. General Requirements for Registered Suppliers  
 R20-2-753. General Requirements for Pipelines and Third-party Terminals  
 R20-2-754. Downstream Blending Exceptions for Transmix  
 R20-2-755. Additional Requirements for AZRBOB and Downstream Oxygenate Blending  
 R20-2-756. Downstream Blending of Arizona CBG with Non-oxygenate Blendstocks  
 R20-2-757. Product Transfer Documentation; Records Retention  
 R20-2-758. Repealed  
 R20-2-759. Testing Methodologies  
 Table A. Arizona Department of Weights and Measures Test Methods for Arizona CBG and AZRBOB  
 R20-2-760. Compliance Surveys  
 R20-2-761. Liability for Noncompliant Arizona CBG or AZRBOB  
 R20-2-762. Penalties  
 Table 1. Type 1 Arizona CBG Standards  
 Table 2. Type 2 Arizona CBG Standards  
 Table 3. Repealed

## ARTICLE 8. REPEALED

*Article 8, consisting of Sections R20-2-801 through R20-2-812, repealed effective October 8, 1998 (Supp. 98-4).*

## ARTICLE 9. GASOLINE VAPOR CONTROL

*R20-2-901 through R20-2-910 recodified from R4-31-901 through R4-31-910 (Supp. 95-1).*

*Article 9, consisting of Sections R4-31-901 through R4-31-910, adopted permanently effective August 31, 1993 (Supp. 93-3).*

*Article 9, consisting of Sections R4-31-901 through R4-31-909, adopted again by emergency action effective June 1, 1993,*

8. Leave a vapor recovery site where there is a non-compliant system or component without securing the system or component from commercial use.

#### Historical Note

Adopted effective July 27, 1983 (Supp. 83-4). R20-2-604 recodified from R4-31-604 (Supp. 95-1). Amended effective October 8, 1998 (Supp. 98-4). Amended by final rulemaking at 10 A.A.R. 1690, effective June 5, 2004 (Supp. 04-2).

#### R20-2-605. Material Incorporated by Reference

The following documents are incorporated by reference and on file with the Department. The documents incorporated by reference contain no future editions or amendments.

1. California Air Resources Board Executive Order G-70-17-AD, *Modification of Certification of the Emco Wheaton Balance Phase II Vapor Recovery System*, May 6, 1993, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
2. California Air Resources Board Executive Order G-70-36-AD, *Modification of Certification of the OPW Balance Phase II Vapor Recovery System*, September 18, 1992, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
3. California Air Resources Board Executive Order G-70-52-AM, *Certification of Components for Red Jacket, Hirt, and Balance Phase II Vapor Recovery Systems*, October 4, 1991, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
4. California Air Resources Board Executive Order G-70-70-AC, *Modification of Certification of the Healy Phase II Vapor Recovery System for Gasoline Dispensing Facilities*, June 23, 1992, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
5. California Air Resources Board Executive Order G-70-150-AE, *Modification to the Certification of the Marconi Commerce Systems Inc. (MCS) "Formerly Gibarco" VaporVac Phase II Vapor Recovery System*, July 12, 2000, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
6. California Air Resources Board Executive Order G-70-153-AD, *Modification to the Certification of the Dresser/Wayne WayneVac Phase II Vapor Recovery System*, April 3, 2000, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
7. California Air Resources Board Executive Order G-70-154-AA, *Modification to the Certification of the Tokheim MaxVac Phase II Vapor Recovery System*, June 10, 1997, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
8. California Air Resources Board Executive Order G-70-163-AA, *Modification to the Certification of the OPW VaporEZ Phase II Vapor Recovery System*, September 4, 1996, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
9. California Air Resources Board Executive Order G-70-164-AA, *Modification to Certification of the Hasstech VCP-3A Vacuum Assist Phase II Vapor Recovery System*, December 10, 1996, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
10. California Air Resources Board Executive Order G-70-165, *Certification of the Healy Vacuum Assist Phase II Vapor Recovery System with the Model 600 Nozzle*, April 20, 1995, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
11. California Air Resources Board Executive Order G-70-169-AA, *Modification to the Certification of the Franklin Electric INTELLIVAC Phase II Vapor Recovery System*, August 11, 1997, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
12. California Air Resources Board Executive Order G-70-177-AA, *Modification to the Certification of the Hirt VCS400-7 Vacuum Assist Phase II Vapor Recovery System*, December 9, 1999, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
13. California Air Resources Board Executive Order G-70-180, *Order Revoking Certification of Healy Phase II Vapor Recovery Systems for Gasoline Dispensing Facilities*, April 17, 1997, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
14. California Air Resources Board Executive Order G-70-183-AA, *Relating to Language Correction in Existing Executive Order G-70-183 (Healy Systems, Inc.)*, June 29, 2001, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
15. California Air Resources Board Executive Order G-70-186, *Certification of the Healy Model 400 ORVR Vapor Recovery System*, October 26, 1998, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
16. California Air Resources Board Executive Order G-70-188, *Certification of the Catlow ICVN Vapor Recovery Nozzle System for use with the Gilbarco VaporVac Vapor Recovery System*, May 18, 1999, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
17. California Air Resources Board Executive Order G-70-191-AA, *Relating to Language Correction in Existing Executive Order G-70-191 (Healy Systems, Inc.)*, July 30, 2001, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.
18. California Air Resources Board Executive Order G-70-196, *Certification of the Saber Technologies, LLC SaberVac VR Phase II Vapor Recovery System*, December 30, 2000, California Air Resources Board, P.O. Box 2815, Sacramento, California 95812-2815.

#### Historical Note

New Section made by final rulemaking at 10 A.A.R. 1690, effective June 5, 2004 (Supp. 04-2).

### ARTICLE 7. MOTOR FUELS AND PETROLEUM PRODUCTS

**Editor's Note:** The following Section was amended under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt amendment expired when the Section was permanently adopted with changes (Supp. 98-3).

#### R20-2-701. Definitions

In addition to the definitions in R20-2-101, the following definitions apply to this Article unless the context otherwise requires:

"Area A" has the same meaning as in A.R.S. § 49-541.

"Area B" has the same meaning as in A.R.S. § 49-541.

"Arizona Cleaner Burning Gasoline" or "Arizona CBG" means a gasoline blend that meets the requirements of this



Article for gasoline produced and shipped to or within Arizona and sold or offered for sale for use in motor vehicles within the CBG-covered area, except as provided under A.R.S. § 41-2124(K).

“AZRBOB” or “Arizona Reformulated Blendstock for Oxygenate Blending” means a combination of gasoline blendstocks that is intended to be or represented to constitute Arizona CBG upon the addition of a specified amount (or range of amounts) of fuel ethanol after the blendstock is supplied from the facility at which it was produced or imported.

“Batch” means a quantity of motor fuel or AZRBOB that is homogeneous for motor fuel properties specific for the motor fuel standards applicable to that motor fuel or AZRBOB.

“Beginning of transport” means the point at which:

A registered supplier relinquishes custody of Arizona CBG or AZRBOB to a transporter or third-party terminal; or

A registered supplier that retains custody of Arizona CBG or AZRBOB begins transfer of the Arizona CBG or AZRBOB into a vessel, tanker, or other container for transport to the CBG-covered area.

“Biodiesel” means a diesel fuel substitute that satisfies all of the following:

*Is produced from nonpetroleum renewable resources if the qualifying volume of nonpetroleum renewable resources meets the standards for California diesel fuel as adopted by the California air resources board pursuant to 13 California code of regulations sections 2281 and 2282 in effect on January 1, 2000. Meets the registration requirement for fuels and additives established by the environmental protection agency pursuant to section 211 of the clean air act as defined in section 49-401.01.*

*The use of the diesel fuel substitute complies with the requirements listed in 10 Code of Federal Regulations part 490, as printed in the federal register, volume 64, number 96, May 19, 1999.*

*Is sold, offered or exposed for sale as a neat product or blended with diesel fuel.* A.R.S. § 41-2051(1).

“Blendstock” means any liquid compound that is blended with another liquid compound to produce a motor fuel, including Arizona CBG. A deposit-control or similar additive registered under 40 CFR 79 is not a blendstock.

“CARB” means the California Air Resources Board.

“CARBOB” means California Reformulated Gasoline Blendstock for Oxygenate Blending.

“CARBOB Model” means the procedures incorporated by reference in R20-2-702(12).

“CARB Phase 2 gasoline” means gasoline that meets the specifications incorporated by reference in R20-2-702(8).

“CARB Phase 3 gasoline” means gasoline that meets the specifications incorporated by reference in R20-2-702(9).

“CBG-covered area” means a county with a population of 1,200,000 or more persons according to the most recent United States decennial census and any portion of a county within area A.

“Conventional gasoline” means gasoline that conforms to the requirements of this Chapter for sale or use in Arizona, but does not meet the requirements of Arizona CBG or AZRBOB.

“Designated alternative limit” means a motor fuel property specification, expressed in the nearest part per million by weight for sulfur content, nearest 10th percent by volume for aromatic hydrocarbon content, nearest 10th percent by volume for olefin content, and nearest degree

Fahrenheit for T90 and T50, that is assigned by a registered supplier to a final blend of Type 2 Arizona CBG or AZRBOB for purposes of compliance with the Predictive Model Procedures.

“Diesel” or “diesel fuel” means a refined middle distillate for use as a motor fuel in a compression-ignition internal-combustion engine.

“Downstream oxygenate blending” means combining AZRBOB and fuel ethanol to produce fungible Arizona CBG.

“Duplicate” means a portion of a sample that is treated the same as the original sample to determine the accuracy and precision of an analytical method.

“E85” means a fuel ethanol gasoline blend that meets the specifications in ASTM D 5798, which is incorporated by reference in R20-2-702.

“EPA” means the United States Environmental Protection Agency.

“EPA waiver” means a waiver granted by the Environmental Protection Agency as described in “Waiver Requests under Section 211(f) of the Clean Air Act,” which is incorporated by reference in R20-2-702.

“Final distribution facility” means a stationary motor-fuel transfer point at which motor fuel or AZRBOB is transferred into a cargo tank truck, pipeline, or other delivery vessel from which the motor fuel or AZRBOB will be delivered to a motor-fuel dispensing site. A cargo tank truck is a final distribution facility if the cargo tank truck transports motor fuel or AZRBOB and carries documentation that the type and amount or range of amounts of oxygenates designated by the registered supplier will be or have been blended directly into the cargo tank truck before delivery of the resulting motor fuel to a motor-fuel dispensing site.

“Fleet” means at least 25 motor vehicles owned or leased by the same person.

“Fleet vehicle fueling facility” means a facility or location where a motor fuel is dispensed for final use by a fleet.

“Fuel ethanol” means denatured ethanol that meets the specifications in ASTM D 4806, which is incorporated by reference in R20-2-702.

“Gasoline” means a volatile, highly flammable liquid mixture of hydrocarbons that does not contain more than .05 grams of lead for each United States gallon, is produced, refined, manufactured, blended, distilled, or compounded from petroleum, natural gas, oil, shale oils or coal, and other flammable liquids free from undissolved water, sediment, or suspended matter, with or without additives, and is commonly used as a fuel for spark-ignition internal-combustion engines. Gasoline does not include diesel fuel or E85.

“Importer” means any person that assumes title or ownership of Arizona CBG or AZRBOB produced by an unregistered supplier.

“Manufacturer’s proving ground” means a facility used only to develop complete motor vehicles, that are not currently available on the retail market, for an automotive manufacturer.

“Motor fuel” means petroleum or a petroleum-based substance such as motor gasoline, any grade of oxygenated gasoline, aviation fuel, number one or number two diesel fuel including neat biodiesel or a biodiesel blend, and E85 typically used in the operation of a motor engine.

“Motor fuel dispensing site” means a facility or location where a motor fuel is dispensed into commerce for final use.

“Motor fuel property” means any characteristic listed in R20-2-751(A)(1) through (A)(7), R20-2-751(B)(1) through (B)(7), Table 1, Table 2, or any other motor fuel standard referenced in this Article.

“Motor vehicle” means a vehicle equipped with a spark-ignited or compression-ignition internal combustion engine except:

A vehicle that runs on or is guided by rails; or

A vehicle that is designed primarily for travel through air or water.

“Motor vehicle racing event” means a competition, including related practice and qualifying and demonstration laps that uses unlicensed motor vehicles designed and manufactured specifically for racing and is conducted on a public or private racecourse for the entertainment of the general public.

“MTBE” means methyl tertiary butyl ether.

“Neat” means straight or 100 percent; not blended with gasoline.

“NOx” means oxides of nitrogen.

“Octane,” “octane number,” or “octane rating” mean the anti-knock characteristic of gasoline as determined by the resultant arithmetic test average of ASTM D2699 and ASTM D2700.

*“Oxygenate” means any oxygen-containing ashless, organic compound, including aliphatic alcohols and aliphatic ethers, that may be used as a fuel or as a gasoline blending component and is approved as a blending agent under the provisions of a waiver issued by the EPA under 42 U.S.C. 7545(f).*

“Oxygenate blender” means a person that owns, leases, operates, controls, or supervises an oxygenate-blending facility, or that owns or controls the blendstock or gasoline used, or the gasoline produced, at an oxygenate-blending facility.

“Oxygenate-blending facility” means any location (including a truck) where fuel ethanol is added to Arizona CBG or AZRBOB and the resulting quality or quantity of Arizona CBG is not altered in any other manner except for the addition of a deposit-control or similar additive registered under 40 CFR 79.

“Oxygenated Arizona CBG” means Arizona CBG with a minimum oxygen content of 3.7 wt. % or another minimum oxygen content approved by the Director under A.R.S. § 41-2124, that is produced and shipped to or within Arizona and sold or offered for sale for use in motor vehicles in the CBG-covered area from November 1 through January 31 of each year.

“Oxygen content” means the percentage by weight of oxygen contained in a gasoline oxygenate blend as calculated by ASTM D 4815.

“Performance standard” means the VOC and NOx emission reduction percentages in R20-2-751(A)(8) and Table 1.

“Pipeline” means a transporter that owns or operates an interstate common-carrier pipe to transport motor fuels into Arizona.

“PM” or “Predictive Model Procedures” means the California Predictive Model and CARB’s “California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model,” as adopted April 20, 1995, and “California Procedures for Evaluating Alternative Specifications for

Phase 3 Reformulated Gasoline Using the California Predictive Model,” as amended April 25, 2001, both of which are incorporated by reference in R20-2-702. This definition will not become effective until Arizona’s revised State Implementation Plan regarding CARB 3 is approved by EPA.

“PM alternative gasoline formulation” means a final blend of Arizona CBG or AZRBOB that is subject to a set of PM alternative specifications.

“PM alternative specifications” means the specifications for the following fuel properties, as determined using a testing methodology in R20-2-759:

Maximum RVP, expressed in the nearest 100th of a pound per square inch;

Maximum sulfur content, expressed in the nearest part per million by weight;

Maximum olefin content, expressed in the nearest 10th of a percent by volume;

Minimum and maximum oxygen content, expressed in the nearest 10th of a percent by weight;

Maximum T50, expressed in the nearest degree Fahrenheit;

Maximum T90, expressed in the nearest degree Fahrenheit; and

Maximum aromatic hydrocarbon content, expressed in the nearest 10th of a percent by volume.

“PM averaging compliance option” means, with reference to a specific fuel property, the compliance option for PM alternative gasoline formulations by which final blends of Arizona CBG and AZRBOB are assigned designated alternative limits under R20-2-751(G), (H), and (I).

“PM averaging limit” means a PM alternative specification that is subject to the PM averaging compliance option.

“PM flat limit” means a PM alternative specification that is subject to the PM flat limit compliance option.

“PM flat limit compliance option” means, with reference to a specific fuel property, the compliance option that each gallon of gasoline must meet for that specified fuel property as contained in the PM alternative specifications.

“Produce” means:

Except as otherwise provided, to convert a liquid compound that is not Arizona CBG or AZRBOB into Arizona CBG or AZRBOB. If a person blends a blendstock that is not Arizona CBG or AZRBOB with Arizona CBG or AZRBOB acquired from another person, and the resulting blend is Arizona CBG or AZRBOB, the person conducting the blending produces only the portion of the blend not previously Arizona CBG or AZRBOB. If a person blends Arizona CBG or AZRBOB with other Arizona CBG or AZRBOB in accordance with this Article, without the addition of a blendstock that is not Arizona CBG or AZRBOB, that person is not a producer of Arizona CBG or AZRBOB.

If a person supplies Arizona CBG or AZRBOB to a refiner that agrees in writing to further process the Arizona CBG or AZRBOB at the refiner’s refinery and be treated as the producer of Arizona CBG or AZRBOB, the refiner is the producer of the Arizona CBG or AZRBOB.

If an oxygenate blender blends oxygenates into AZRBOB supplied from a gasoline production or import facility, and does not alter the quality or

quantity of the AZRBOB or the quality or quantity of the resulting Arizona CBG certified by a registered supplier in any other manner except for the addition of a deposit-control or similar additive, the producer or importer of the AZRBOB, rather than the oxygenate blender, is considered the producer or importer of the full volume of the resulting Arizona CBG.

“Producer” means a refiner or other person that produces a motor fuel, including Arizona CBG or AZRBOB.

“Production facility” means a facility at which a motor fuel, including Arizona CBG or AZRBOB, is produced. Upon request of a producer, the Director may designate, as part of the producer’s production facility, a physically separate bulk storage facility that:

- Is owned or leased by the producer;
- Is operated by or at the direction of the producer; and
- Is used to store or distribute motor fuels, including Arizona CBG or AZRBOB, that are supplied only from the production facility.

“Product transfer document” means a bill of lading, loading ticket, manifest, delivery receipt, invoice, or other paper that is provided by the transferor at the time motor fuel is delivered and evidences that custody or title of the motor fuel is transferred to the transferee. A product transfer document is not required when motor fuel is sold or dispensed at a motor fuel dispensing site or fleet vehicle fueling facility.

“Refiner” means a person that owns, leases, operates, controls, or supervises a refinery in the United States, including its trust territories.

“Refinery” means a facility that produces a liquid fuel, including Arizona CBG or AZRBOB, by distilling petroleum, or a transmix facility that produces a motor fuel offered for sale or sold into commerce as a finished motor fuel.

“Registered supplier” means a producer or importer that supplies Arizona CBG or AZRBOB and is registered with the Director under R20-2-750.

“Reproducibility” means the testing method margin of error as provided in the ASTM specification or other testing method required under this Article.

“RVP” means Reid vapor pressure equivalent of gasoline or blendstock as measured according to ASTM D 5191.

“Supply” means to provide or transfer motor fuel to a physically separate facility, vehicle, or transportation system.

“Test result” means any document that contains a result of testing including all original test measures, all subsequent test measures that are not identical to the original test measure, and all worksheets on which calculations are performed.

“Third-party terminal” means an owner or operator of a gasoline storage tank facility that accepts custody, but not ownership, of Arizona CBG or AZRBOB from a registered supplier, oxygenate blender, pipeline, or other third-party terminal and relinquishes custody of the Arizona CBG or AZRBOB to a transporter.

“Transmix” means a mixture of petroleum distillate fuel and gasoline that does not meet the Arizona standards for either petroleum distillate fuels or gasoline.

“Transmix facility” means a facility at which transmix is processed into its components and then the components either are combined with a finished product or further processed to produce a finished motor fuel.

“Transporter” means a person that causes motor fuels, including Arizona CBG or AZRBOB, to be transported into or within Arizona.

“Type 1 Arizona CBG” means a gasoline that meets the standards contained in R20-2-751(A) and Table 1.

“Type 2 Arizona CBG” means a gasoline that meets the standards contained in Table 2 or is certified using the PM according to the requirements of R20-2-751(G), (H), and (I), and:

Meets the requirements in R20-2-751(A) beginning February 1 through October 31 of each year; and

Meets the requirements in R20-2-751(B) beginning November 1 through January 31 of each year.

“Vehicle emissions control area” has the same meaning as in A.R.S. § 49-541 except that a vehicle emissions control area does not include a manufacturer’s proving ground that is located in the vehicle emissions control area.

“VOC” means volatile organic compound.

“Winter” means November 1 through January 31.

#### Historical Note

Former Section R4-31-204(K) and Section R4-31-205(A)(1) through (5) renumbered without change as Section R4-31-701 (Supp. 89-1). Amended as R4-31-204(O) and incorporated into R4-31-701 effective September 29, 1989 (Supp. 89-3). Amended effective October 12, 1990 (Supp. 90-4). Amended by emergency amendment effective September 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-3). Emergency amendments adopted again without change effective December 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-4). Emergency amendments adopted again without change effective March 20, 1992, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 92-1). Emergency expired. Amended with changes effective August 17, 1992 (Supp. 92-3).

R20-2-701 recodified from R4-31-701 (Supp. 95-1). Amended effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim amendment expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently amended October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 7 A.A.R. 1025, effective February 9, 2001 (Supp. 01-1). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### R20-2-702. Material Incorporated by Reference

- A. The following documents are incorporated by reference and on file with the Department. The documents incorporated by reference contain no future editions or amendments.
1. 16 CFR 306 - Automotive Fuel Ratings, Certification and Posting, January 1, 1998 Edition, Superintendent of Documents, U.S. Government Printing Office, Mail Stop SSOP, Washington, D.C. 20402-9328.
  2. ASTM D 975-04c, Standard Specification for Diesel Fuel Oils, 2004, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.
  3. ASTM D 4806-04a, Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel, 2004, American

Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

4. ASTM D 4814-04a, Standard Specification for Automotive Spark-Ignition Engine Fuel, 2004, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.
5. Waiver Requests under Section 211(f) of the Clean Air Act, (August 22, 1995 edition), United States Environmental Protection Agency, Transportation and Regional Programs Division, Fuels Program Support Group, Mail Code 6406-J, Washington, D.C. 20460.
6. ASTM D 5798-99, Standard Specification for Fuel Ethanol (Ed75-Ed85) for Automotive Spark-Ignition Engines, re-approved 2004, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.
7. ASTM D 6751-03a, Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels, 2003, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.
8. California Air Resources Board, "California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model," adopted April 20, 1995. A copy may be obtained at: CARB, P.O. Box 2815, Sacramento, CA 95812.
9. California Air Resources Board, "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model," as amended April 25, 2001. A copy may be obtained at: CARB, P.O. Box 2815, Sacramento, CA 95812.
10. The Federal Complex Model as contained in 40 CFR 80.45, January 1, 1999. A copy may be obtained at: U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, D.C. 20402-9328.
11. California Air Resources Board, The California Reformulated Gasoline Regulations, Title 13, California Code of Regulations, Section 2266.5 (Requirements Pertaining to California Reformulated Gasoline Blendstock for Oxygen Blending (CARBOB) and Downstream Blending), as of April 9, 2005. A copy may be obtained at: CARB, P.O. Box 2815, Sacramento, CA 95812.
12. California Air Resources Board, Procedures for Using the California Model for California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB), adopted April 25, 2001. A copy may be obtained at: CARB, P.O. Box 2815, Sacramento, CA 95812.

- B.** Subsections (A)(9), (A)(11), and (A)(12) will not become effective until Arizona's revised State Implementation Plan regarding CARB 3 is approved by EPA.

#### Historical Note

Adopted by emergency amendment effective September 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-3). Emergency rule adopted again without change effective December 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-4).

Emergency rule adopted again without change effective March 20, 1992, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 92-1). Emergency expired. Adopted with changes effective August 17, 1992 (Supp. 92-3).

R20-2-702 recodified from R4-31-702 (Supp. 95-1). Amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 10 A.A.R. 1690, effective June 5, 2004 (Supp. 04-2). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### R20-2-703. Volumetric Inspection of Motor Fuels and Motor Fuel Dispensers

- A.** After completing an inspection, the Department shall return all motor fuel to the owner or operator of the service station at the site where the Department collected the motor fuel.
- B.** After completing an inspection, if a motor fuel cannot be returned to the owner or operator of the service station at the site where the Department collected the motor fuel, the Department shall transport the motor fuel to another site of the owner or operator's choice and within a 20-mile radius of the inspection site.

#### Historical Note

Former Section R4-31-204(A) renumbered without change as Section R4-31-703 (Supp. 89-1). Amended effective October 12, 1990 (Supp. 90-4). R20-2-703 recodified from R4-31-703 (Supp. 95-1). Amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4).

#### R20-2-704. Price and Grade Posting on External Signs

- A.** A person who owns or operates a service station that has an external sign shall ensure that the sign:
  1. Identifies whether the price differs depending on whether the payment is cash, credit, or debit;
  2. Identifies the self-service and full-service prices, if different;
  3. Discloses the full price of motor fuel including fractions of a cent and all federal and state taxes, if the sign displays the motor fuel price. A decimal point shall be used in the displayed price when a dollar sign precedes the posted price;
  4. Displays lettering at a height of at least 1/5 of the letter height of the motor fuel price displayed on the external sign or 2 1/2", whichever is larger, and is visible from the road;
  5. States the terms of any condition if the displayed price is conditional upon the sale of another product or service. The terms of any condition shall comply with the letter height requirement in subsection (A)(4);
  6. Describes diesel fuel as No. 1 diesel, #1 diesel, No. 2 diesel, #2 diesel, or biodiesel; and
  7. Identifies the unit of measure of the price, if it is other than per gallon.
- B.** Effective June 5, 2004, if a sign uses the following terms to describe a gasoline grade or gasoline-oxygenate blend, the grade or blend shall meet the following minimum antiknock index:

Term	Minimum Antiknock Index
1. Regular, Reg, Unleaded, UNL, or UL	87
2. Midgrade, Mid, or Plus	89
3. Premium, PREM, Super, Supreme, High, or High Performance	91

#### Historical Note

Former Section R4-31-204(B) renumbered without change as Section R4-31-704 (Supp. 89-1). Amended effective October 12, 1990 (Supp. 90-4). Amended effective August 17, 1992 (Supp. 92-3). R20-2-704 recodified from R4-31-704 (Supp. 95-1). Former Section R20-2-704 repealed; new Section R20-2-704 renumbered from R20-2-705 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 10 A.A.R. 1690,



effective June 5, 2004 (Supp. 04-2).

**R20-2-705. Price, Octane, and Lead-substitute Notification on Dispensers**

- A.** A service station owner or operator shall ensure that information regarding pricing, motor fuel grade, octane rating, and lead-substitute addition displayed on a service station motor fuel dispenser:
1. Is clean, legible, and visible at all times;
  2. Is displayed electronically or with a sign or label on the upper 60 percent of each face of the dispenser;
  3. Lists the full price of the motor fuel including fractions of a cent and all federal and state taxes;
  4. Displays the highest price of motor fuel sold from the dispenser if the dispenser is capable of dispensing and computing the price of multiple grades of motor fuel;
  5. Displays a discount, if offered, in letters at least 1/4" in height on each face of the dispenser and next to the undiscounted price;
  6. Displays both a cash and credit price on a dispenser that is capable of electronically displaying both cash and credit prices;
  7. Posts both a cash and credit price on each face of a dispenser that is preset by the cashier if the dispenser is unable to display electronically and simultaneously both cash and credit prices;
  8. Posts a price-per-gallon sign next to or on a non-price computing dispenser for a retail-only sale of liquefied petroleum gas used as an alternative motor fuel; and
  9. Complies with the requirements of R20-2-704(A)(1), (A)(2), (A)(3), (A)(5), (A)(6), and (A)(7).
- B.** A person who owns or operates a service station shall ensure that:
1. The octane rating of each grade of gasoline is displayed on the upper 60 percent of each face of each dispenser, as prescribed by 16 CFR 306; and
  2. The signs required by Handbook 130, for gasoline dispensers that dispense gasoline with lead substitute, are displayed on the upper 60 percent of each face of each dispenser in letters at least 1/4" in height.

**Historical Note**

Former Section R4-31-204(C) renumbered without change as Section R4-31-705 (Supp. 89-1). Amended effective August 17, 1992 (Supp. 92-3). R20-2-705 recodified from R4-31-705 (Supp. 95-1). Former Section R20-2-705 renumbered to R20-2-704; new Section R20-2-705 renumbered from R20-2-706 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 10 A.A.R. 1690, effective June 5, 2004 (Supp. 04-2).

**R20-2-706. Unattended Retail Dispensers**

In addition to all labeling and sign requirements in this Article, an owner or operator of an unstaffed service station shall post on or next to each motor fuel dispenser a sign or label, in public view, that conspicuously lists the owner's or operator's name, address, and telephone number.

**Historical Note**

Former Section R4-31-204(D) renumbered without change as Section R4-31-706 (Supp. 89-1). Amended effective August 17, 1992 (Supp. 92-3). R20-2-706 recodified from R4-31-706 (Supp. 95-1). Former Section R20-2-706 renumbered to R20-2-705; new Section R20-2-706 renumbered from R20-2-707 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4).

**R20-2-707. Product Transfer Documentation and Record Retention for Motor Fuel other than Arizona CBG and AZRBOB**

- A.** If a person transfers custody or title to a motor fuel that is not Arizona CBG or AZRBOB, and the motor fuel is not sold or dispensed at a service station or fleet vehicle fueling facility, the person shall provide to the transferee documents that include the following information:
1. The name and address of the person transferring custody or title;
  2. The name and address of the transferee;
  3. The grade of the motor fuel;
  4. The volume of each grade of motor fuel being transferred;
  5. The date of the transfer;
  6. Product transfer document number;
  7. For conventional gasoline, the minimum octane rating of each grade;
  8. For conventional gasoline, the type and maximum volume of oxygenate contained in each grade;
  9. For conventional gasoline transported in or through the CBG covered area, the statement, "This gasoline is not intended for use inside the CBG covered area"; and
  10. Whether a lead substitute is present in the gasoline and the type of lead substitute present.
- B.** A registered supplier, third-party terminal, or pipeline may use standardized product codes on pipeline tickets as the product transfer documentation.
- C.** A person identified in subsection (A) shall retain product transfer documentation for each shipment delivered for 12 months. This documentation shall be available within two working days from the time of the Department's request.
- D.** A person identified in subsection (A) shall maintain product transfer documentation for a transfer or delivery during the preceding 30 days at that person's address listed on the product transfer documentation.
- E.** A service station owner or operator or fleet owner shall maintain product transfer documentation for the three most recent deliveries of each grade of motor fuel on the service station owner's or operator's or fleet owner's premises. This documentation shall be available for Department review.
- F.** The Department shall accept a legible photocopy of a product transfer document instead of the original.
- G.** A person transferring custody or title of Arizona CBG or AZRBOB shall comply with R20-2-757.

**Historical Note**

Former Section R4-31-204(E) renumbered without change as Section R4-31-707 (Supp. 89-1). Amended effective August 17, 1992 (Supp. 92-3). R20-2-707 recodified from R4-31-707 (Supp. 95-1). Former Section R20-2-707 renumbered to R20-2-706; new Section R20-2-707 renumbered from R20-2-709 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4).

**R20-2-708. Oxygenated Fuel Blends**

A person that has custody of gasoline blended with an oxygenate shall ensure that the amount of oxygenate does not exceed the amount allowed by EPA waivers, Section 211(f) of the Clean Air Act, and A.R.S. § 41-2122. The maximum oxygen content of gasoline shall not exceed 3.7 percent by weight for fuel ethanol and as specified in A.R.S. § 41-2122 for other oxygenates.

**Historical Note**

Former Section R4-31-204(F) renumbered without change as Section R4-31-708 (Supp. 89-1). Amended

effective October 12, 1990 (Supp. 90-4). R20-2-708 recodified from R4-31-708 (Supp. 95-1). Former Section R20-2-708 repealed; new Section R20-2-708 renumbered from R20-2-710 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4).

Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### **R20-2-709. Retail Oxygenated Fuel Labeling**

- A.** The owner or operator of a motor fuel dispensing site shall ensure that a motor fuel dispenser that offers gasoline containing fuel ethanol that results in a gasoline blend containing 1.5 percent or more by weight of oxygen is clearly labeled with the fuel ethanol volume information. Each face of each motor fuel dispenser shall be clearly labeled with the oxygenate volume information if the percent by volume is more than 4.3 percent by volume of fuel ethanol.
- B.** The owner or operator of a motor fuel dispensing site shall ensure that labels required under subsection (A) are displayed on the upper 60 percent of each face of each motor fuel dispenser. The label indicating the maximum percent by volume of oxygenate contained in the oxygenated fuel shall state: "Contains up to \_\_\_\_\_ % fuel ethanol."
- C.** In the CBG-covered area and area B, the owner or operator of a motor fuel dispensing site shall ensure that a label displayed on each face of each motor fuel dispenser contains the following statement: "This gasoline is oxygenated and will reduce carbon monoxide emissions from motor vehicles." The statement may be printed on the label required in subsection (B) or on a separate label. If the statement is printed on a separate label, the label shall be displayed next to the label required in subsection (B).
- D.** The owner or operator of a motor fuel dispensing site shall ensure that:
  1. The label required by subsection (B) is clean, legible, and visible at all times;
  2. The label is printed in black or white block letters on a sharply contrasting background; and
  3. The lettering on labels required by subsections (B) and (C) is no less than 1/4".

#### **Historical Note**

Former Section R4-31-204(G) renumbered without change as Section R4-31-709 (Supp. 89-1). Former R4-31-709 repealed, new Section R4-31-709 adopted by emergency action effective September 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-3). Former R4-31-709 repealed again, new Section R4-31-709 adopted again without change by emergency action effective December 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-4). Former R4-31-709 repealed again, new Section adopted again by emergency action without change effective March 20, 1992, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 92-1). Emergency expired. Former Section R4-31-709 repealed, new Section R4-31-709 adopted with changes effective August 17, 1992 (Supp. 92-3). R20-2-709 recodified from R4-31-709 (Supp. 95-1).

Amended effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3).

Interim amendment expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently amended October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3).

Former Section R20-2-709 renumbered to R20-2-707;

new Section R20-2-709 renumbered from R20-2-711 and amended by final rulemaking at 5 A.A.R. 4312, effective

October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### **R20-2-710. Blending Requirements**

- A.** A person that has custody of or transports an oxygenated gasoline blend shall ensure that no neat oxygenate blending occurs at a motor fuel dispensing site or fleet vehicle fueling facility.
- B.** If a motor fuel dispensing site storage tank contains an oxygenated gasoline blend that does not contain the amount of oxygen required by A.R.S. §§ 41-2122, 41-2123, 41-2125, or R20-2-751, the owner or operator of the motor fuel dispensing site shall do one of the following:
  1. Add gasoline that contains no more than 20 percent by volume of the same oxygenate to the non-compliant oxygenated gasoline blend;
  2. Add a gasoline blend that dilutes the non-compliant oxygenated gasoline blend to the level of oxygen content required by A.R.S. §§ 41-2122, 41-2123, 41-2125, or R20-2-751; or
  3. Empty the storage tank and replace the non-compliant oxygenated gasoline blend with a required oxygenate blend.

#### **Historical Note**

Former Section R4-31-204(H) renumbered without change as Section R4-31-710 (Supp. 89-1). Amended effective February 21, 1990 (Supp. 90-1). See emergency amendment below (Supp. 92-1). Amended by emergency action effective September 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-3). Emergency amendments adopted again without change effective December 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-4). Emergency amendments adopted again without change effective March 20, 1992, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 92-1). Emergency expired. Amended effective August 17, 1992 (Supp. 92-3). R20-2-710 recodified from R4-31-710 (Supp. 95-1). Former Section R20-2-710 renumbered to R20-2-708; new Section R20-2-710 renumbered from R20-2-713 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### **R20-2-711. Alcohol-oxygenated Gasoline Storage Tank Requirements**

- A.** Before a person adds an alcohol-oxygenated gasoline into a storage tank, the person shall:
  1. Test the storage tank for the presence of water and, if any water is detected, remove the water from the storage tank; and
  2. Install a fuel filter designed for use with alcohol-oxygenated gasoline in the fuel line of all motor fuel dispensers that dispense alcohol-oxygenated gasoline.
- B.** If water is detected in a storage tank or in an alcohol-oxygenated gasoline in a storage tank, the owner or operator shall empty the storage tank.

#### **Historical Note**

Former Section R4-31-204(I) renumbered without change as Section R4-31-711 (Supp. 89-1). Section repealed, new Section adopted effective February 21, 1990 (Supp. 90-1). Amended effective October 1, 1990 (Supp. 90-4). Amended by emergency action effective September 20, 1991, pursuant to A.R.S. § 41-1026, valid

for only 90 days (Supp. 91-3). Emergency amendments adopted again without change effective December 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-4). Emergency amendments adopted again without change effective March 20, 1992, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 92-1). Emergency expired. Amended with changes effective August 17, 1992 (Supp. 92-3). R20-2-711 recodified from R4-31-711 (Supp. 95-1). Former Section R20-2-711 renumbered to R20-2-709; new Section R20-2-711 renumbered from R20-2-715 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### **R20-2-712. Water in Service Station Motor Fuel Storage Tanks**

A service station owner or operator shall ensure that water in a service station motor fuel storage tank other than an alcohol gasoline blend, does not exceed 1" in depth when measured from the bottom through the fill pipe. The service station owner or operator shall remove all water from the tank before delivery or sale of motor fuel from that tank.

##### **Historical Note**

Former Section R4-31-204(J) renumbered without change as Section R4-31-712 (Supp. 89-1). Section repealed, new Section adopted effective February 21, 1990 (Supp. 90-1). Amended by emergency action effective September 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-3). Emergency amendments adopted again without change effective December 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-4). Emergency amendments adopted again without change effective March 20, 1992, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 92-1). Emergency expired. Amended with changes effective August 17, 1992 (Supp. 92-3). R20-2-712 recodified from R4-31-712 (Supp. 95-1). Former Section R20-2-712 repealed; new Section R20-2-712 renumbered from R20-2-716 by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4).

#### **R20-2-713. Motor Fuel Storage Tank Labeling**

- A.** A service station owner or operator shall ensure that all motor fuel storage tank fill pipes and gasoline vapor return lines located at a service station are labeled to identify the contents accurately as:
  1. Unleaded gasoline,
  2. Unleaded midgrade gasoline,
  3. Unleaded premium gasoline,
  4. No. 1 or #1 diesel fuel,
  5. No. 2 or #2 diesel fuel, or
  6. Gasoline vapor return.
- B.** A service station owner or operator shall ensure that labels are at least 1 1/2" x 5" with at least 1/4" black or white block lettering on a sharply contrasting background and that the label is clean, visible, and legible at all times.
- C.** A service station owner or operator may display other information on the reverse side of a two-sided label.
- D.** A service station owner or operator shall not put motor fuel into storage tanks without attaching the proper label.

##### **Historical Note**

Adopted as R4-31-204(K) and renumbered as R4-31-713 effective September 29, 1989 (Supp. 89-3). Amended effective October 12, 1990 (Supp. 90-4). R20-2-713 recodified from R4-31-713 (Supp. 95-1). Former Section

R20-2-713 renumbered to R20-2-710; new Section R20-2-713 renumbered from R20-2-717 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4).

#### **R20-2-714. Requirements for Motor Fuels Outside the CBG-covered Area**

- A.** A person that owns or operates a motor fuel dispensing site or transmix or production facility outside the CBG-covered area shall ensure that a motor fuel offered for sale at the motor fuel dispensing site or transmix or production facility meets all the appropriate specifications in R20-2-702 except:
  1. From May 1 through September 30, gasoline shall meet the specifications in ASTM D 4814-04a except maximum vapor pressure shall be 9.0 pounds per square inch;
  2. For gasoline blends, the vapor pressure may be no more than one pound per square inch greater than the vapor pressures established by ASTM D 4814-04a during:
    - a. May 1 through September 15, if the gasoline-fuel ethanol blend meets the requirements of ASTM D 4814-04a, the volatility requirements of subsection (A)(1), and the final gasoline-fuel ethanol blend contains at least nine percent fuel ethanol by volume but does not exceed the volume specified in EPA waivers; and
    - b. September 16 through April 30, if the gasoline-fuel ethanol blend meets the requirements of ASTM D 4814-04a and the final gasoline-fuel ethanol blend contains at least 1.5 percent fuel ethanol by weight but does not exceed the volume specified in EPA waivers.
- B.** The owner or operator of a motor fuel dispensing site shall ensure that the finished gasoline is visually free of water, sediment, and suspended matter and is clear and bright at ambient temperature or 70° F (21° C), whichever is greater.
- C.** The owner or operator of a motor fuel dispensing site or transmix or production facility shall ensure that the minimum octane rating determined by the test average of ASTM D 2699 and ASTM D 2700, also known as the (R+M)/2 method, is:
  1. 87 for unleaded or regular;
  2. 88 for mid-grade, extra, or any other gasoline with an octane rating of 88 or higher; and
  3. 90 for super, high performance, premium, or any other gasoline with an octane rating of 90 or higher.
- D.** Prohibited activities regarding a motor fuel sold or offered for sale outside the CBG-covered area.
  1. The owner or operator of a motor fuel dispensing site shall not sell or offer for sale from the motor fuel dispensing site storage tank a product that is not a motor fuel;
  2. The owner or operator of a motor fuel dispensing site or transmix or production facility shall not sell or offer for sale a motor fuel that contains more than 0.3 volume percent MTBE or more than 0.1 weight percent oxygen from all other ethers or alcohols as listed in A.R.S. § 41-2122.
  3. A transporter shall not deliver to a motor fuel dispensing site or place in a motor fuel dispensing site storage tank a product that is not motor fuel.

##### **Historical Note**

Adopted as R4-31-204(L) and renumbered as R4-31-714 effective September 29, 1989 (Supp. 89-3). R20-2-714 recodified from R4-31-714 (Supp. 95-1). Former Section R20-2-714 repealed; new Section R20-2-714 renumbered from R20-2-718 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 10 A.A.R. 1690, effective June 5, 2004 (Supp. 04-2). Amended by final



rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### **R20-2-715. Motor Fuel Quality Testing Methods and Requirements**

- A. Unless otherwise required in A.R.S. Title 41, Chapter 15, or this Chapter, the producer of a motor fuel shall test the motor fuel for its motor fuel properties using the methodologies in R20-2-702 and ensure that the motor fuel meets the applicable specifications in the material incorporated by reference in R20-2-702.
- B. Unless otherwise required in A.R.S. Title 41, Chapter 15, or this Chapter, a person testing #1 or #2 diesel fuel shall use the methodologies and meet the specifications of ASTM D 975-04c.
- C. The owner or operator of a transmix or production facility shall ensure that all gasoline sold or offered for sale outside the CBG-covered area has its octane rating determined and certified in accordance with 16 CFR 306 using the average of ASTM D 2699 and ASTM D 2700, also known as the (R+M)/2 method. The owner or operator of a motor fuel dispensing site shall ensure that all gasoline sold or offered for sale outside the CBG-covered area has its octane rating posted in accordance with 16 CFR 306.

##### **Historical Note**

Adopted as R4-31-204(M) and renumbered as R4-31-715 effective September 29, 1989 (Supp. 89-3). Amended effective October 12, 1990 (Supp. 90-4). Amended by emergency action effective September 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-3). Emergency amendments adopted again without change effective December 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-4). Emergency amendments adopted again without change effective March 20, 1992, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 92-1). Emergency expired. Amended with changes effective August 17, 1992 (Supp. 92-3). R20-2-715 recodified from R4-31-715 (Supp. 95-1). Former Section 20-2-715 renumbered to R20-2-711; new Section R20-2-715 renumbered from R20-2-720 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 10 A.A.R. 1690, effective June 5, 2004 (Supp. 04-2). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### **R20-2-716. Sampling and Access to Records**

- A. The Department shall obtain motor fuel samples for testing from:
  - 1. The same motor fuel dispenser used for sales to customers;
  - 2. The same motor fuel dispenser used for dispensing motor fuel into fleet vehicles;
  - 3. A bulk storage facility;
  - 4. A pipeline having custody of motor fuel, including Arizona CBG or AZRBOB;
  - 5. A transporter of motor fuel, including Arizona CBG or AZRBOB;
  - 6. A final distribution facility;
  - 7. A third-party terminal having custody of motor fuel, including Arizona CBG or AZRBOB;
  - 8. An oxygenate blender or registered supplier; or
  - 9. A transmix or production facility.
- B. An owner or operator of a motor fuel dispensing site, pipeline, third-party terminal, or storage, transmix, production, or distribution facility, or a transporter, registered supplier, or oxygenate blender shall maintain for five years records relating to

producing, importing, blending, transporting, distributing, delivering, testing, or storing motor fuels, including Arizona CBG or AZRBOB, and shall make the records available for Department inspection upon request.

##### **Historical Note**

Adopted as R4-31-204(N) and renumbered as R4-31-716 effective September 29, 1989 (Supp. 89-3). Repealed effective October 12, 1990 (Supp. 90-4). New Section R4-31-716 adopted effective August 17, 1992 (Supp. 92-3). R20-2-716 recodified from R4-31-716 (Supp. 95-1). Former Section R20-2-716 renumbered to R20-2-712; new Section R20-2-716 renumbered from R20-2-721 and amended by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### **R20-2-717. Hold-open Latch Exception**

If an owner or operator of a motor fuel dispensing site has a motor fuel nozzle equipped with a hold-open latch, the owner or operator shall ensure that the latch operates according to the manufacturer's specifications.

##### **Historical Note**

Adopted effective October 19, 1989 (Supp. 89-4). Amended effective August 17, 1992 (Supp. 92-3). R20-2-717 recodified from R4-31-717 (Supp. 95-1). Section R20-2-717 renumbered to R20-2-713 by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). New Section made by final rulemaking at 10 A.A.R. 1690, effective June 5, 2004 (Supp. 04-2). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

#### **R20-2-718. Requirements for the Production or Sale of E85**

- A. Requirements applicable statewide.
  - 1. A producer of E85 or the owner or operator of a motor fuel dispensing site that dispenses E85 shall ensure that the E85 sold or offered for sale in Arizona meets all the specifications in ASTM D 5798-99.
  - 2. An owner or operator of a motor fuel dispensing site shall ensure that both the motor fuel dispenser and nozzle from which E85 is dispensed have labels affixed that indicate E85 is not gasoline and is intended for use only in a flexible-fuel vehicle, and stating, "Check your owner's manual to ensure that this fuel can be used in your vehicle."
  - 3. An owner or operator of a motor fuel dispensing site shall ensure that any motor fuel dispenser from which E85 is dispensed is compatible with E85 and meets the requirements in R20-2-203.
  - 4. A producer of E85 shall report to the Department, by the 15th of the month following the production of E85, the following information regarding the E85 production:
    - a. The amount of fuel ethanol used during the previous month,
    - b. The amount of gasoline used during the previous month,
    - c. The total amount of E85 produced during the previous month,
    - d. The total amount of E85 sold during the previous month,
    - e. The fuel quality properties for the gasoline and fuel ethanol components making up each batch of E85, and
    - f. The fuel quality properties of each batch of final E85 blend.
- B. Requirements applicable in the CBG-covered area.



1. A producer of E85 for sale in the CBG-covered area shall use Arizona CBG or AZRBOB as the gasoline portion of the E85 blend.
2. A producer of E85 for sale in the CBG-covered area shall ensure that the fuel ethanol used meets the standard in R20-2-751(C).

**Historical Note**

Former Section R4-31-205(B) renumbered without change as R4-31-718 (Supp. 89-1). Amended as R4-31-205(B) and incorporated into R4-31-728 effective September 29, 1989 (Supp. 89-3). Amended effective February 21, 1990 (Supp. 90-1). Subsections (3) through (10) corrected (Supp. 91-3). Amended by emergency action effective September 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-3). Emergency amendments adopted again without change effective December 20, 1991, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 91-4). Emergency amendments adopted again without change effective March 20, 1992, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 92-1). Emergency expired. Amended with changes effective August 17, 1992 (Supp. 92-3). R20-2-718 recodified from R4-31-718 (Supp. 95-1). Section R20-2-718 renumbered to R20-2-714 by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). New Section made by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

**R20-2-719. Requirements for the Sale of Biodiesel**

- A. A person shall not sell or offer or expose for sale:
  1. Biodiesel that is not tested or does not meet the specifications established by ASTM D 6751,
  2. A blend of biodiesel and diesel fuel that is not tested or does not meet the specifications established by ASTM D 975-04c, or
  3. Biodiesel or a blend of biodiesel and diesel fuel for use in Area A that contains sulfur in excess of 15 ppm.
- B. *A person who blends biodiesel that is intended as a final product for the fueling of motor vehicles shall report to the director by the fifteenth day of each month the quantity and quality of biodiesel shipped to or produced in this state during the preceding month. A person who supplies biodiesel subject to this subsection shall report the following by batch:*
  1. *The percentage of biodiesel in a final blend.*
  2. *The volume of the finished product.*
  3. *For neat biodiesel, the results of analysis for those parameters established by ASTM D6751.*
  4. *For biodiesel blended with any diesel fuel, the results of the analysis of the following motor fuel parameters as established by ASTM D975:*
    - a. Sulfur content.
    - b. Aromatic hydrocarbon content.
    - c. Cetane number.
    - d. Specific gravity.
    - e. American petroleum institute gravity.
    - f. *The temperatures at which ten per cent, fifty per cent and ninety per cent of the diesel fuel boiled off during distillation.* A.R.S. § 41-2083(L).
- C. A person required to submit a report under subsection (B) shall use a form prescribed by the Director, certify the truthfulness and accuracy of the data submitted, and consent to the Department or its authorized agent collecting samples and accessing records as provided in this Article. A corporate officer who is responsible for operations at the facility that produces or ships the final product shall sign the report.

- D. A person shall label a dispenser at which biodiesel is dispensed in a manner that notifies other persons of the volume percentage of biodiesel in the finished product and with the statement: "This fuel contains biodiesel. Check the owner's manual or with your engine manufacturer before using."

**Historical Note**

Former Section R4-31-205(C) and (D) renumbered without change as R4-31-719 (Supp. 89-1). Amended as R4-31-205(C) and (D) and incorporated into R4-31-719 effective September 29, 1989 (Supp. 89-3). Amended effective August 17, 1992 (Supp. 92-3). R20-2-719 recodified from R4-31-719 (Supp. 95-1). Section repealed by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4). New Section made by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

**R20-2-720. Renumbered****Historical Note**

Former Section R4-31-205(E) renumbered without change as R4-31-720 (Supp. 89-1). Amended effective August 17, 1992 (Supp. 92-3). R20-2-720 recodified from R4-31-720 (Supp. 95-1). Section R20-2-720 renumbered to R20-2-715 by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4).

**R20-2-721. Renumbered****Historical Note**

Former Section R4-31-205(F) renumbered without change as R4-31-721 (Supp. 89-1). Amended as R4-31-205(F) and incorporated into R4-31-721 effective September 29, 1989 (Supp. 89-3). Amended effective October 12, 1990 (Supp. 90-4). Heading amended effective August 17, 1992 (Supp. 92-3). R20-2-721 recodified from R4-31-721 (Supp. 95-1). Amended effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim amendment expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently amended October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Section R20-2-721 renumbered to R20-2-716 by final rulemaking at 5 A.A.R. 4312, effective October 18, 1999 (Supp. 99-4).

**R20-2-722. Reserved through****R20-2-749. Reserved**

*Editor's Note: The following Section was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt rules expired when the Section was permanently adopted with changes (Supp. 98-3).*

**R20-2-750. Registration Relating to Arizona CBG or AZRBOB**

- A. Each of the following shall register with the Director before producing, importing, or obtaining custody of Arizona CBG or AZRBOB:

1. A refiner that produces Arizona CBG or AZRBOB;
  2. An importer that imports Arizona CBG or AZRBOB;
  3. An oxygenate blender that blends oxygenate with AZRBOB to produce Arizona CBG; or
  4. A pipeline or third-party terminal that has custody of Arizona CBG or AZRBOB.
- B.** A person listed in subsection (A) shall register on a form prescribed by the Director and include the following information:
1. Business name, business address, and contact name or position title and telephone number;
  2. For each refinery or oxygenate blending facility, the facility name, physical location, contact name or position title and telephone number, and type of facility;
  3. For each refinery, oxygenate blending facility, or importer:
    - a. The location of the records required under this Article. If records are kept off-site, the primary off-site storage facility name, physical location, and contact name or position title and telephone number; and
    - b. If an independent laboratory is used to meet the requirements of R20-2-752(F), the name and address of the independent laboratory, and contact name or position title and telephone number;
  4. If required under 40 CFR 80.76(d), the EPA registration number; and
  5. A statement of consent permitting the Department or its authorized agent to collect samples and access records as provided in R20-2-716.
- C.** A person registered under subsection (B) shall notify the Director within 10 days after the effective date of a change in any of the information provided under subsection (B).
- D.** If a refiner, importer, or oxygenate blender fails to register under this Section, all Arizona CBG or AZRBOB produced by the refiner or oxygenate blender or imported by the importer and transported to the CBG-covered area is presumed to be noncompliant from the date that registration should have occurred.
- E.** The Department shall maintain a list of all registered suppliers.

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

*Editor's Note: The following Section was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt rules expired when the Section was permanently adopted with changes (Supp. 98-3).*

#### R20-2-751. Arizona CBG Requirements

- A.** General fuel property and performance requirements. In addition to the other requirements of this Article and except as pro-

vided in subsection (B), all Arizona CBG shall meet the following requirements and for any fuel property not specified, shall meet the requirements in ASTM D 4814-04a. The dates in this subsection are compliance dates for the owner or operator of a motor fuel dispensing site or a fleet vehicle fueling facility.

1. Sulfur: 80 ppm by weight (max)
2. Aromatics: 50 percent by volume (max)
3. Olefins: 25 percent by volume (max)
4. E200: 70-30 percent volume
5. E300: 100-70 percent volume
6. Maximum Vapor Pressure
  - a. October 1 - January 31: 9.0 pounds per square inch (psi)
  - b. February: 13.5 psi
  - c. March: 11.5 psi
  - d. April: 10.0 psi
  - e. May: 9.0 psi
  - f. June 1 - September 30: 7.0 psi for CARB Phase 2 gasoline and 7.2 psi for CARB Phase 3 gasoline
7. Oxygen and Oxygenates
  - a. Minimum Content:
    - i. November 1 - January 31: 10 percent fuel ethanol by volume. If A.R.S. § 41-2124(E) petition in effect: 2.7 percent oxygen by weight as approved by the Director.
    - ii. February 1 - October 31: 0 percent by weight (any oxygenate).
  - b. The maximum oxygen content shall not exceed 3.7 percent by weight for fuel ethanol and as specified in A.R.S. § 41-2122 for other oxygenates, and shall comply with the requirements of A.R.S. § 41-2123.
  - c. Arizona CBG shall not contain more than 0.3 volume percent MTBE nor more than 0.1 weight percent oxygen from all other ethers or alcohols listed in A.R.S. § 41-2122.
8. Type 1 Arizona CBG shall meet the Federal Complex Model VOC emissions reduction percentage May 1 through September 15:  $\geq 27.5$  percent (Federal Complex Model settings: Summer, Area Class B, Phase 2). Type 2 Arizona CBG shall meet CARB Phase 2 or Phase 3 PM requirements.

- B.** Wintertime requirements. In addition to the other requirements of this Article, the owner or operator of a motor fuel dispensing site or a fleet vehicle fueling facility shall ensure that beginning November 1 through January 31 of each year, all Arizona CBG meets the following fuel property requirements.

1. Sulfur: 80 ppm by weight (max);
2. Aromatics: 30% by volume (max);
3. Olefins: 10% by volume (max);
4. 90% Distillation Temp. (T90): 330° F (max);
5. 50% Distillation Temp. (T50): 220° F (max);
6. Vapor Pressure: 9.0 psi (max); and
7. Oxygenate - Ethanol;
  - a. Minimum oxygenate content - 10 percent fuel ethanol by volume;
  - b. Maximum oxygen content - 3.7 percent oxygen by weight, and shall comply with the requirements of A.R.S. § 41-2123; and
  - c. Alternative minimum fuel ethanol content may be used if approved by the Director under A.R.S. § 41-2124(D).

- C.** Fuel ethanol specifications. A person that uses fuel ethanol as a blending component with AZRBOB or Arizona CBG shall ensure that the fuel ethanol meets the requirements in ASTM D 4806-04a and the following:

1. A sulfur content not exceeding 10 ppm by weight,
  2. An olefins content not exceeding 0.5 percent by volume, and
  3. An aromatic hydrocarbon content not exceeding 1.7 percent by volume.
- D.** General elections. Except as provided in subsection (E), a registered supplier shall make an initial election, and a subsequent election each time a change occurs, before beginning to transport Arizona CBG or AZRBOB. A registered supplier shall make the election with the Director on a form or in a format prescribed by the Director. The election shall state:
1. Whether the registered supplier (at each point where the Arizona CBG or AZRBOB is certified) will supply Arizona CBG or AZRBOB that complies with Type 1 Arizona CBG, Type 2 Arizona CBG, or the PM alternative gasoline formulation requirements and, if the registered supplier will supply Arizona CBG or AZRBOB that complies with the PM alternative gasoline formulation requirements, whether the registered supplier will certify using the CARB Phase 2 or Phase 3 model; and
  2. For each applicable fuel property or performance standard in the election under subsection (D)(1), whether the Arizona CBG or AZRBOB will comply with the average standards or per-gallon standards. A registered supplier shall not elect to comply with average standards unless the registered supplier is in compliance with R20-2-760. A registered supplier shall not elect to comply with Type 1 Arizona CBG average standards in Table 1, columns B and C, from September 16 through October 31 and February 1 through April 30.
- E.** Winter elections. Beginning November 1 through January 31 of each year, a registered supplier shall ensure that all Arizona CBG or AZRBOB complies with Type 2 Arizona CBG requirements or the PM alternative gasoline formulation requirements under Table 2. A registered supplier shall make an initial election, and a subsequent election each time a change occurs, before beginning to transport Arizona CBG or AZRBOB. A registered supplier shall make the election with the Director on a form or in a format prescribed by the Director. The election shall state:
1. Whether the registered supplier (at each point where the Arizona CBG or AZRBOB is certified) will supply Arizona CBG or AZRBOB that complies with the Type 2 Arizona CBG or the PM alternative gasoline formulation requirements; and
  2. For each applicable fuel property, whether the Arizona CBG or AZRBOB will comply with the average standards or per-gallon standards.
- F.** Certification as Type 1 Arizona CBG or Type 2 Arizona CBG. A registered supplier shall certify Arizona CBG or AZRBOB under R20-2-752 as meeting all requirements of the election made in subsection (D) or (E). For each fuel property, Type 1 Arizona CBG shall comply with the requirements in either column A or columns B through D of Table 1, and shall be certified using the Federal Complex Model, which is incorporated by reference in R20-2-702. For each fuel property, Type 2 Arizona CBG shall comply with the requirements of columns A and B (averaging option), or column C in Table 2. The PM alternative gasoline formulation shall meet the requirements of subsections (G), (H), and (I) and column A of Table 2. A registered supplier may certify Arizona CBG or AZRBOB using an equivalent test method that the Department approves using the criteria stated in R20-2-759.
- G.** Certification and use of Predictive Model for alternative PM gasoline formulations.
1. Except as provided in subsections (G)(4) and (I), a registered supplier shall use the PM as provided in the Predictive Model Procedures.
  2. A registered supplier shall certify a PM alternative gasoline formulation with the Director by either:
    - a. Submitting to the Director a complete copy of the documentation provided to the executive officer of CARB according to 13 California Code of Regulations, Section 2264 and subsection (I); or
    - b. Notifying the Director, on a form prescribed by or in a format acceptable to the Director, of:
      - i. The PM alternative specifications that apply to the final blend, including for each specification whether it is a PM flat limit or a PM averaging limit; and
      - ii. The numerical values for percent change in emissions for oxides of nitrogen and hydrocarbons determined in accordance with the Predictive Model Procedures.
  3. A registered supplier shall deliver the certification required under subsection (G)(2) to the Director before transporting the PM alternative gasoline formulation.
  4. Restrictions for elections to sell or supply final blends as PM alternative gasoline formulations.
    - a. A registered supplier shall not make a new election to sell or supply from its production or import facility a final blend of Arizona CBG as a PM alternative gasoline formulation if the registered supplier has an outstanding requirement under subsection (J) to provide offsets for fuel properties at the same production or import facility.
    - b. If a registered supplier elects to sell or supply from its production or import facility a final blend of Arizona CBG as a PM alternative gasoline formulation subject to a PM averaging compliance option for one or more fuel properties, the registered supplier shall not elect any other compliance option, including another PM alternative gasoline formulation, if an outstanding requirement to provide offsets for fuel properties exists under the provisions of subsection (J). This subsection does not preclude a registered supplier from electing another PM alternative gasoline formulation if:
      - i. The PM flat limit for one or more fuel properties is changed to a PM averaging limit, or a single PM averaging limit for which there is no outstanding requirement to provide offsets is changed to a PM flat limit;
      - ii. There are no changes to the PM alternative specifications for remaining fuel properties; and
      - iii. The new PM alternative formulation meets the criteria in the Predictive Model Procedures.
    - c. If a registered supplier elects to sell or supply from the registered supplier's production or import facility a final blend of Arizona CBG as a PM alternative gasoline formulation, the registered supplier shall not use a previously assigned designated alternative limit for a fuel property to provide offsets under subsection (J).
    - d. If a registered supplier notifies the Director under subsection (D) or (E) that a final blend of Arizona CBG is sold or supplied from a production or import facility as a PM alternative gasoline formulation, all final blends of Arizona CBG or AZRBOB subsequently sold or supplied from that production or

- import facility are subject to the same PM alternative specifications until the registered supplier either:
- i. Designates a final blend at that facility as a PM alternative gasoline formulation subject to different PM alternative specifications; or
  - ii. Elects, under subsection (D) or (E), a final blend at that facility subject to a flat limit compliance option or an averaging compliance option.
- H.** Prohibited activities regarding PM alternative gasoline formulations. A registered supplier shall not sell, offer for sale, supply, or offer to supply from the registered supplier's production or import facility Arizona CBG that is reported as a PM alternative gasoline formulation under R20-2-752 if any of the following occur:
1. The elected PM alternative specifications do not meet the criteria for approval in the Predictive Model Procedures,
  2. The registered supplier is prohibited by subsection (G)(4)(a) from electing to sell or supply the gasoline as a PM alternative gasoline formulation,
  3. The gasoline fails to conform with any PM flat limit in the PM alternative specifications election, or
  4. With respect to any fuel property for which the registered supplier elects a PM averaging limit:
    - a. The gasoline exceeds the applicable PM average limit in Table 2, column B, and no designated alternative limit for the fuel property is established for the gasoline in accordance with subsection (G)(2); or
    - b. A designated alternative limit for the fuel property is established for the gasoline in accordance with subsection (G)(2), and either the gasoline exceeds the designated alternative limit for the fuel property or the designated alternative limit for the fuel property exceeds the PM averaging limit and the exceedance is not fully offset in accordance with subsection (J).
- I.** Oxygen content requirements for PM alternative gasoline formulations. A registered supplier shall ensure that from November 1 through January 31, all alternative PM gasoline formulations comply with oxygen content requirements for the CBG-covered area. Regardless of the oxygen content, a registered supplier shall certify the final alternative PM gasoline formulation using the PM with a minimum oxygen content of 2.0% by weight. A registered supplier may use the CARBOB Model as a substitute for the preparation of a fuel ethanol hand blend and use the fuel qualities calculated under the CARBOB Model for compliance and reporting purposes.
- J.** Offsetting fuel properties and performance standards. A registered supplier that elects to comply with the averaging standards for any of the fuel properties or performance standards contained in Tables 1 and 2, or the PM, shall, from a single production or import facility, complete physical transfer of certified Arizona CBG or AZRBOB in sufficient quantity to offset the amount by which the Arizona CBG or AZRBOB exceeds the averaging standard according to the following schedule:
1. A registered supplier that elects to comply with the averaging standards contained in Table 2 or the PM shall offset each exceeded average standard within 90 days before or after beginning to transport any final blend of Arizona CBG or AZRBOB from the production or import facility;
  2. A registered supplier that elects to comply with the averaging standard for the VOC Emission Reduction Percentage in Table 1, column B, shall offset an exceedance of the standard that occurs from May 1 to September 15 during that same period; and
  3. A registered supplier that elects to comply with the averaging standard for the NOx Emission Reduction Percentage contained in Table 1, column B, shall offset an exceedance of the standard that occurs from May 1 to September 15 during that same period.
- K.** Consequence of failure to comply with averages.
1. In addition to a penalty under R20-2-762, if any, a registered supplier that fails to comply with a requirement of subsection (J) shall meet the applicable per-gallon standards contained in Table 1, Table 2, or an alternative PM gasoline formulation, for a probationary period as follows:
    - a. For a registered supplier that elects to comply with the standards contained in Table 1, the probationary period begins on the first day of the next averaging season and ends on the last day of that averaging season if the conditions of subsection (K)(2) are met;
    - b. For a registered supplier that elects to comply with the standards contained in Table 2 or the PM, the probationary period begins no later than 90 days after the registered supplier determines, or receives a notice from the Director, that the registered supplier did not comply with the requirements of subsection (J). Before the probationary period begins, the registered supplier shall notify the Director in writing of the beginning date of the probationary period. The probationary period ends 90 days after its beginning date.
  2. A registered supplier shall not produce or import Arizona CBG or AZRBOB under an averaging compliance election until:
    - a. The registered supplier submits a compliance plan to the Director that includes:
      - i. An implementation schedule for actions to correct noncompliance, and
      - ii. Reporting requirements that document implementation of the compliance plan,
    - b. The Director approves the plan,
    - c. The registered supplier implements the plan, and
    - d. The registered supplier achieves compliance.
  3. If a registered supplier fails to comply with the requirements of subsection (J) within one year of the end of a probationary period under subsection (K)(1), the registered supplier shall comply with applicable per-gallon standards for a subsequent probationary period of two years, or until the conditions in subsection (K)(2) are satisfied, whichever is later.
    - a. If a registered supplier elects to comply with the Table 1 standards, the probationary period begins on the first day of the next averaging season.
    - b. If a registered supplier elects to comply with the Table 2 standards or the PM, the probationary period begins no later than 90 days after the registered supplier determines, or receives notice from the Director, that the registered supplier did not comply with the requirements of subsection (J). Before the probationary period begins, the registered supplier shall notify the Director in writing of the beginning date of the probationary period.
  4. If a registered supplier fails to comply with the requirements of subsection (J) within one year after the end of a probationary period provided under subsection (K)(3),



the registered supplier shall permanently comply with applicable per-gallon standards.

- L. Effect of VOC survey failure. Each time a VOC survey conducted under R20-2-760 shows excess VOC emissions in the CBG-covered area, the VOC emissions performance reduction in R20-2-751(A)(8) and the minimum per-gallon VOC emission reduction percentage in Table 1, column C shall be increased by an absolute 1.0 percent, not to exceed the VOC percent emissions reduction percentage per-gallon standard in Table 1, column A.
- M. Effect of NOx survey failure. Each time a NOx survey conducted under R20-2-760 shows excess NOx emissions in the CBG-covered area, the NOx average emission reduction percentage applicable to the period of May 1 through September 15 in Table 1, column B shall be increased by an absolute 1.0 percent.
- N. Subsequent survey compliance. If the minimum VOC or average NOx emissions reduction percentage has been made more stringent according to subsection (L) or (M) and all emissions reduction surveys for VOC or NOx for two consecutive years show emissions within the applicable adjusted reduction percentage in the CBG-covered area, the applicable VOC or NOx emissions adjusted reduction percentage shall be reduced by an absolute 1.0 percent beginning in the year following the year in which the second compliant survey is conducted. Each emissions reduction percentage adjusted under this subsection shall not be decreased below the following:
  1. >27 percent for the VOC emissions reduction percentage, May 1 - September 15, Table 1, column C; and
  2. >6.8 percent for the NOx emissions reduction percentage, May 1 - September 15, Table 1, column B.
- O. Subsequent survey failures. If a VOC or NOx emissions reduction percentage is made less stringent under subsection (N) and a subsequent VOC or NOx survey shows excess VOC or NOx emissions in the CBG-covered area:
  1. For a VOC survey failure, the Federal Complex Model VOC emissions reduction percentage in R20-2-751(A)(8) and the minimum per gallon VOC emission reduction percentage in Table 1, column C shall be increased by an absolute 1.0 percent, not to exceed the VOC percent emissions reduction percentage per gallon standard in Table 1, column A;
  2. For a NOx survey failure, the NOx average emission reduction percentage applicable May 1 through September 15 in Table 1, column B shall be increased by an absolute 1.0 percent; and
  3. If the VOC or NOx emission reduction percentage is increased under subsection (O)(1) or (O)(2), the VOC or NOx emission reduction percentage shall not be made less stringent regardless of the result of subsequent surveys for VOC or NOx emissions.
- P. Effective date for adjusted standards. If a performance standard is adjusted by operation of subsection (L), (M), (N), or (O), the effective date for the change is the beginning of the next averaging season for which the standard is applicable.
- Q. Subsections (A)(6)(a), (b), (c), and (f), (A)(7)(a)(i) and (ii), (A)(8), (B), (D)(2), (E), and (I) will not become effective until Arizona's revised State Implementation Plan regarding CARB 3 and shortening the winter season is approved by EPA.

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes Octo-

ber 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 7 A.A.R. 1025, effective February 9, 2001 (Supp. 01-1). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

*Editor's Note: The following Section was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt rules expired when the Section was repealed under the regular rulemaking process (Supp. 98-3).*

#### R20-2-751.01. Repealed

##### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption repealed October 1, 1998, under Laws 1997, Ch. 117, § 3; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3).

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#### R20-2-752. General Requirements for Registered Suppliers

- A. A registered supplier shall certify that each batch of Arizona CBG or AZRBOB transported for sale or use in the CBG-covered area meets the standards in this Article.
- B. A registered supplier shall make the certification on a form or in a format prescribed by the Director. The registered supplier shall include in the certification information on shipment volumes, fuel properties as determined under R20-2-759, and performance standards for each batch of Arizona CBG or AZRBOB. The registered supplier shall submit the certification to the Director on or before the 15th day of each month for each batch of Arizona CBG or AZRBOB transported during the previous month.
- C. Recordkeeping and records retention.
  1. A registered supplier that samples and analyzes a final blend or shipment of Arizona CBG or AZRBOB under this Section shall maintain, for five years from the date of each sampling, records of the following:
    - a. Sample date;
    - b. Identity of blend or product sampled;
    - c. Container or other vessel sampled;
    - d. The final blend or shipment volume; and
    - e. The test results for sulfur, aromatic hydrocarbon, olefin, oxygen, RVP, and as applicable, T50, T90, E200, and E300 as determined under R20-2-759.
  2. If Arizona CBG or AZRBOB produced or imported by a registered supplier is not tested and documented as

- required by this Section, the Director shall deem the Arizona CBG or AZRBOB to have a RVP, sulfur, aromatic hydrocarbon, olefin, oxygen, T50, and T90 that exceeds the standards specified in R20-2-751 or the comparable PM averaging limits, unless the registered supplier demonstrates to the Director that the Arizona CBG or AZRBOB meets all applicable fuel property limits and performance standards.
3. A registered supplier shall provide to the Director any records maintained by the registered supplier under this Section within 20 days of a written request from the Director. If a registered supplier fails to provide records for a blend or shipment of Arizona CBG or AZRBOB, the Director shall deem the final blend or shipment of Arizona CBG or AZRBOB in violation of R20-2-751, unless the registered supplier demonstrates to the Director that the Arizona CBG or AZRBOB meets all applicable fuel property limits and performance standards.
- D. Notification requirement.** A registered supplier shall notify the Director by fax before transporting Arizona CBG or AZRBOB into the CBG-covered area by a means other than a pipeline.
- E. Quality Assurance and Quality Control (QA/QC) Program.** A registered supplier shall develop a QA/QC program to demonstrate the accuracy and effectiveness of the registered supplier's laboratory testing of Arizona CBG or AZRBOB. The registered supplier shall submit the QA/QC program to the Director for approval at least three months before the registered supplier transports Arizona CBG or AZRBOB. The Director shall approve a QA/QC program only if the Director determines that the QA/QC program ensures that the registered supplier's laboratory testing procedures comply with R20-2-759 and the data generated by the registered supplier's laboratory are complete, accurate, and reproducible. If the registered supplier makes significant changes to the QA/QC program, the registered supplier shall resubmit the QA/QC program to the Director for review and approval. Within 30 days of receiving the changed QA/QC program, the Director shall determine whether the changed QA/QC program meets the original quality objectives. The Director shall approve the changed QA/QC program if it meets the quality objectives. Instead of developing a QA/QC program, a registered supplier may comply with the independent testing requirements of subsection (F).
- F. Independent testing.**
1. A registered supplier of Arizona CBG or AZRBOB that does not develop a QA/QC program shall conduct a program of independent sample collection and analysis for the Arizona CBG or AZRBOB produced or imported, that complies with one of the following:
    - a. Option 1. A registered supplier shall, for each batch of Arizona CBG or AZRBOB produced or imported, have an independent laboratory collect and analyze a representative sample from the batch using the methodology specified in R20-2-759 for compliance with each fuel property and performance standard for which the Arizona CBG or AZRBOB is certified.
    - b. Option 2. A registered supplier shall have an independent testing program for all Arizona CBG or AZRBOB that the registered supplier produces or imports that consists of the following:
      - i. An independent laboratory shall collect a representative sample from each batch;
      - ii. The Director or designee shall identify up to 10% of the samples collected under subsection (F)(1)(b)(i) for analysis; and
      - iii. The independent laboratory shall, for each sample identified by the Director or designee, analyze the sample using the methodology specified in R20-2-759 for compliance with each fuel property and performance standard for which the Arizona CBG or AZRBOB is certified.
  2. The Director or designee may request in writing a duplicate of the batch sample collected under subsection (F)(1)(a) or (F)(1)(b) for analysis by a laboratory selected by the Director or designee. The registered supplier shall submit a duplicate of the sample to the Director within 24 hours of the written request.
  3. Designation of independent laboratory.
    - a. A registered supplier that does not develop a QA/QC program shall designate one independent laboratory for each production or import facility at which the registered supplier produces or imports Arizona CBG or AZRBOB. The independent laboratory shall collect samples and perform analyses according to subsection (F).
    - b. A registered supplier shall identify the designated independent laboratory to the Director under the registration requirements of R20-2-750.
    - c. A laboratory is considered independent if:
      - i. The laboratory is not operated by a registered supplier or the registered supplier's subsidiary or employee;
      - ii. The laboratory does not have any interest in any registered supplier; and
      - iii. The registered supplier does not have any interest in the designated laboratory.
    - d. Notwithstanding the restrictions in subsection (F)(3)(c), the Director shall consider a laboratory independent if it is owned or operated by a pipeline owned or operated by four or more registered suppliers.
    - e. A registered supplier shall not use a laboratory that is debarred, suspended, or proposed for debarment according to the Government-wide Debarment and Suspension regulations, 40 CFR 32, or the Debarment, Suspension and Ineligibility provisions of the Federal Acquisition Regulations, 48 CFR 9.4.
  4. A registered supplier shall ensure that its designated independent laboratory:
    - a. Records the following at the time the designated independent laboratory collects a representative sample from a batch of Arizona CBG or AZRBOB:
      - i. The producer's or importer's assigned batch number for the batch sampled;
      - ii. The volume of the batch;
      - iii. The identification number of the gasoline storage tank in which the batch is stored at the time the sample is collected;
      - iv. The date and time the batch became Arizona CBG or AZRBOB;
      - v. The date and time the sample is collected;
      - vi. The grade of the batch (for example, unleaded premium, unleaded mid-grade, or unleaded); and
      - vii. For Arizona CBG or AZRBOB produced by computer-controlled in-line blending, the date and time the blending process began and the date and time the blending process ended, unless exempt under subsection (G);

- b. Retains each sample collected under this subsection for at least 45 days, unless this time is extended by the Director for up to 180 days;
  - c. Submits to the Director a quarterly report on the 15th day of January, April, July, and October of each year that includes, for each sample of Arizona CBG or AZRBOB analyzed under subsection (F):
    - i. The results of the independent laboratory's analyses for each fuel property, and
    - ii. The information specified in subsection (F)(4)(a) for each sample; and
  - d. Supplies to the Director, upon request, a duplicate of the sample.
- G.** Exemptions to QA/QC and independent laboratory testing requirements. A registered supplier that produces or imports Arizona CBG or AZRBOB using computer-controlled in-line blending equipment and operates under an exemption from EPA under 40 CFR 80.65(f)(iv), is exempt from the requirements of subsections (E) and (F), if reports of the results of the independent audit program of the registered supplier's computer-controlled in-line blending operation, which are submitted to EPA under 40 CFR 80.65(f)(iv), are submitted to the Director by March 1 of each year.
- H.** Use of laboratory analysis for certification of Arizona CBG and AZRBOB.
1. If both a registered supplier and an independent laboratory collect a sample from the same batch of Arizona CBG or AZRBOB and perform a laboratory analysis under subsection (F) to determine compliance of the sample with a fuel property, the registered supplier and independent laboratory shall use the same test methodology. The results of the analysis conducted by the registered supplier shall be used for certification of the Arizona CBG or AZRBOB under subsection (B), unless the absolute value of the difference between the two results is larger than one of the following:
    - a. Sulfur content: 25 ppm by weight;
    - b. Aromatics: 2.7% by volume;
    - c. Olefins: 2.5% by volume;
    - d. Fuel ethanol: 0.4% by volume;
    - e. RVP: 0.3 psi;
    - f. 50% distillation temperature: ASTM reproducibility for that sample using the slope from the registered supplier's results;
    - g. 90% distillation temperature: ASTM reproducibility for that sample using the slope from the registered supplier's results;
    - h. E200: 2.5% by volume;
    - i. E300: 3.5% by volume; or
    - j. API gravity: 0.3° API.
  2. If the absolute value of the difference between the results of the analyses conducted by the registered supplier and independent laboratory is larger than one of the values specified in subsection (H)(1), the registered supplier shall use one of the following for certification of the batch of Arizona CBG or AZRBOB under subsection (B):
    - a. The larger of the two values for each fuel property, except the smaller of the two values shall be used for measures of oxygenates; or
    - b. Have a second independent laboratory analyze the Arizona CBG or AZRBOB for each fuel property. If the difference between the results obtained by the second independent laboratory and those obtained by the registered supplier are within the range listed in subsection (H)(1), the registered supplier's results

shall be used for certifying the Arizona CBG or AZRBOB under subsection (B).

#### Historical Note

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#### R20-2-753. General Requirements for Pipelines and Third-party Terminals

- A.** A pipeline or third-party terminal shall not accept Arizona CBG or AZRBOB for transport unless:
1. The Arizona CBG or AZRBOB is physically transferred from an importer, refiner, oxygenate blender, pipeline, or third-party terminal registered with the Department under R20-2-750; and
  2. The registered supplier provides written verification that the gasoline is Arizona CBG or AZRBOB and complies with the standards in R20-2-751(A) or (B), as applicable, without reproducibility or numerical rounding.
- B.** A pipeline or third-party terminal that transports Arizona CBG or AZRBOB shall collect a sample of each incoming batch. The pipeline or third-party terminal shall retain the sample for at least 30 days unless this time is extended for an individual sample for up to 180 days by the Director.
- C.** A pipeline shall conduct quality control testing of Arizona CBG or AZRBOB at a frequency of at least one sample from one batch completing shipment for each registered supplier each day at each input location.
- D.** A pipeline shall provide the Director with a report summarizing the quality control testing results obtained under subsection (C) within 10 days of the end of each month. The report shall contain the quantity of Arizona CBG or AZRBOB, date tendered, whether the Arizona CBG or AZRBOB was transported by pipeline, present sample location, and laboratory analysis results.
- E.** If a batch does not meet the standards in R20-2-751(A) or (B), as applicable, but is within reproducibility, the pipeline shall notify the Director by fax within 48 hours of the batch volume and date tendered, proposed shipment date, whether the batch was transported by the pipeline, present batch location, and laboratory analysis results.
- F.** If a batch does not meet the standards in R20-2-751(A) or (B), as applicable, including reproducibility, the pipeline or third-party terminal shall notify the Director by fax within 24 hours of the batch quantity and date tendered, proposed shipment date, whether the batch was transported by the pipeline,



present batch location, and laboratory analysis results. If the batch is in the pipeline's or third-party terminal's control, the pipeline or third-party terminal shall prevent release of the batch from a distribution point until the batch is certified as meeting the standards in R20-2-751(A) or (B), as applicable.

- G. A pipeline or third-party terminal shall develop a QA/QC program to demonstrate the accuracy and effectiveness of the pipeline's or third-party terminal's laboratory testing. The QA/QC program for a pipeline or third-party terminal shall include a description of the laboratory testing protocol used to verify that Arizona CBG or AZRBOB transported to the CBG-covered area meets the standards in R20-2-751(A) or (B). A pipeline or third-party terminal shall submit the QA/QC program to the Director for approval at least three months before the pipeline or third-party terminal begins to transport Arizona CBG or AZRBOB. The Director shall approve a QA/QC program only if the Director determines that the QA/QC program ensures that the pipeline's or third-party terminal's laboratory testing produces data that are complete, accurate, and reproducible. If a pipeline or third-party terminal makes significant changes to the QA/QC program, the pipeline or third-party terminal shall resubmit the QA/QC program to the Director for review and approval. Within 30 days of receiving the changed QA/QC program, the Director shall determine whether the changed QA/QC program meets the quality objectives originally approved by the Department. The Director shall approve the changed QA/QC program if it meets the quality objectives.
- H. A portion of a facility that a third-party terminal uses for production, import, or oxygenate blending is exempt from this Section, but the third-party terminal shall operate the exempt portion of the facility in compliance with requirements for registered suppliers in R20-2-752 and oxygenate blenders in R20-2-755, as applicable.
- I. A pipeline is not liable under R20-2-761 if it follows all of the procedures in this Section.

#### Historical Note

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#### R20-2-754. Downstream Blending Exceptions for Transmix

- A. Pipelines may blend transmix into Arizona CBG or AZRBOB at a rate not to exceed 1/4 of 1% by volume. Each pipeline shall document the transmix blending (recording each batch and volume of transmix blended) and maintain the records at the terminal for two years from the date of blending.

- B. One of two methods shall be used to measure the transmix as it is blended into the product stream:

1. Meters, calibrated at least twice each year; or
2. Tank gauge as per API Manual of Petroleum Measurement Standards, Chapters 3.1A (1st edition, December 1994) and 3.1B (1st edition, April 1992), incorporated by reference and on file with the Department and the Office of the Secretary of State. A copy may also be obtained at American Petroleum Institute, 1220 L St., N.W., Washington, D.C. 20045-4070. This incorporation by reference contains no future editions or amendments.

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3).

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#### R20-2-755. Additional Requirements for AZRBOB and Downstream Oxygenate Blending

- A. Application of Arizona CBG standards to AZRBOB.
  1. Determining whether AZRBOB complies with Arizona CBG standards.
    - a. If a registered supplier designates a final blend as AZRBOB and complies with the provisions of this Section, the fuel properties and performance standards of the AZRBOB, for purposes of compliance with Table 2, are determined by adding the specified amount of fuel ethanol to a representative sample of the AZRBOB and testing the resulting gasoline using the test methods in R20-2-759 or certifying the AZRBOB using the CARBOB model. If the registered supplier designates a range of amounts of fuel ethanol to be added to the AZRBOB, the minimum designated amount of fuel ethanol shall be added to the AZRBOB to determine the fuel properties and performance standards of the resulting Arizona CBG. If a registered supplier does not comply with this subsection, the Department shall determine whether the AZRBOB complies with applicable fuel properties and performance standards, excluding requirements for RVP, without adding fuel ethanol to the AZRBOB.
    - b. In determining whether AZRBOB complies with the Arizona CBG standards, the registered supplier shall ensure that the fuel ethanol added to the representative sample under subsection (A)(1)(a) is representative of the fuel ethanol the registered supplier reasonably expects will be subsequently added to the AZRBOB.



2. Calculating the volume of AZRBOB. If a registered supplier designates a final blend as AZRBOB and complies with this Section, the volume of AZRBOB is calculated for compliance purposes under R20-2-751 by adding the minimum amount of fuel ethanol designated by the registered supplier. If a registered supplier fails to comply with this subsection, the Department shall calculate the volume of AZRBOB for purposes of compliance with applicable fuel properties and performance standards without adding the amount of fuel ethanol to the AZRBOB.
- B. Restrictions on transferring AZRBOB.**
1. A person shall not transfer ownership or custody of AZRBOB to any other person unless the transferee notifies the transferor in writing that:
    - a. The transferee is a registered oxygenate blender and will add fuel ethanol in the amount (or within the range of amounts) designated in R20-2-757 before the AZRBOB is transferred from a final distribution facility, or
    - b. The transferee will take all reasonably prudent steps necessary to ensure that the AZRBOB is transferred to a registered oxygenate blender that adds the amount (or within the range of amounts) of fuel ethanol designated in R20-2-757 to the AZRBOB before the AZRBOB is transferred from a final distribution facility.
  2. A person shall not sell or supply Arizona CBG from a final distribution facility if the amount or range of amounts of fuel ethanol designated in R20-2-757 has not been added to the AZRBOB.
- C. Restrictions on blending AZRBOB with other products.** A person shall not combine AZRBOB supplied from the facility at which the AZRBOB is produced or imported with any other AZRBOB, gasoline, blendstock, or oxygenate, except for:
1. Fuel ethanol in the amount (or within the range of amounts) specified by the registered supplier at the time the AZRBOB is supplied from the production or import facility, or
  2. Other AZRBOB for which the same fuel ethanol amount (or range of amounts) is specified by the registered supplier at the time the AZRBOB is supplied from the production or import facility.
- D. Quality assurance sampling and testing requirements for a registered supplier supplying AZRBOB from a production or import facility.** A registered supplier supplying AZRBOB from a production or import facility shall use an independent third-party quality assurance sampling and testing program as described in subsection (E) or conduct a quality assurance sampling and testing program that meets the requirements of 40 CFR 80.69(a)(7), as it existed on July 1, 1996, except for the changes listed in subsections (D)(1) through (D)(3). 40 CFR 80.69(a)(7), July 1, 1996, is incorporated by reference and on file with the Department. A copy may be obtained at the U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, D.C. 20402-9328. The material incorporated includes no future editions or amendments.
1. 40 CFR 80.69(a)(7). The word "RBOB" is changed to read "AZRBOB";
  2. 40 CFR 80.69(a)(7). "...using the methodology specified in § 80.46..." is changed to read "...using the methodology specified in R20-2-759..." and
  3. 40 CFR 80.69(a)(7)(ii). "(within the correlation ranges specified in § 80.65(e)(2)(i))" is changed to read "(within the ranges of the applicable test methods).
- E. General requirements for an independent third-party quality assurance sampling and testing program.** A registered supplier may contract with an independent third party that conducts a quality assurance sampling and testing program for one or more registered suppliers. The registered supplier shall ensure that the quality assurance sampling and testing program:
1. Is designed and conducted by a third party that is independent of the registered supplier. To be considered independent:
    - a. The third party shall not be an employee of a registered supplier,
    - b. The third party shall not have an obligation to or interest in any registered supplier, and
    - c. The registered supplier shall not have an obligation to or interest in the third party;
  2. Is conducted from November 1 through January 31 on all samples collected under the program design previously approved by the Director under subsection (G);
  3. Involves sampling and testing that is representative of all Arizona CBG dispensed in the CBG-covered area;
  4. Analyzes each sample for oxygenate according to the methodologies specified in R20-2-759;
  5. Bases results on an analysis of each sample collected during the sampling period unless a specific sample does not comply with the applicable per gallon maximum or minimum standards for the fuel property being evaluated in addition to any reproducibility applicable to the fuel property;
  6. Participates in a correlation program with the Director to ensure the validity of analysis results;
  7. Does not provide advance notice, except as provided in subsection (F), of the date or location of any sampling;
  8. Provides a duplicate of any sample, with information regarding where and the date on which the sample was collected, upon request of the Director, within 30 days after submitting the report required under subsection (E)(10);
  9. Permits a Department official to monitor sample collection, transportation, storage, and analysis at any time; and
  10. Prepares and submits a report to the Director within 30 days after the sampling is completed that includes the following information:
    - a. Name of the person collecting the samples;
    - b. Attestation by an officer of the third party that the sampling and testing was done according to the program plan approved by the Director under subsection (G) and the results are accurate;
    - c. Identification of the registered supplier for whom the sampling and testing program was conducted if the sampling and testing program was conducted for only one registered supplier;
    - d. Identification of the area from which the samples were collected;
    - e. Address of each motor fuel dispensing site from which a sample was collected;
    - f. Dates on which the samples were collected;
    - g. Results of the analysis of the samples for oxygenate type and oxygen weight percent, aromatic hydrocarbon, and olefin content, E200, E300, and RVP, and the calculated VOC or NOx emissions reduction percentage, as applicable;
    - h. Name and address of each laboratory at which the samples were analyzed;
    - i. Description of the method used to select the motor fuel dispensing sites from which a sample was collected;

- j. Number of samples collected at each motor fuel dispensing site; and
  - k. Justification for excluding a collected sample if one was excluded.
- F. An independent third party that contracts with one or more registered suppliers to conduct a quality assurance sampling and testing program shall begin the sampling on the date selected by the Director. The Director shall inform the third party of the date selected at least 10 business days before sampling is to begin.
- G. To obtain the Director's approval of an independent third-party quality assurance sampling and testing program plan, the person seeking the approval shall:
  - 1. Submit the plan to the Director no later than January 1 to cover the sampling and testing period from November 1 through January 31 of each year, and
  - 2. Have the plan signed by an officer of the third party that will conduct the sampling and testing program.
- H. No later than September 1 of each year, a registered supplier that intends to meet the requirements in subsection (D) by contracting with an independent third party to conduct quality assurance sampling and testing from November 1 through January 31 shall enter into the contract and pay all of the money necessary to conduct the sampling and testing program. The registered supplier may pay the money necessary to conduct the sampling and testing program to the third party or to an escrow account with instructions to the escrow agent to release the money to the third party as the testing program is implemented. No later than September 15, the registered supplier shall submit to the Director a copy of the contract with the third party, proof that the money necessary to conduct the sampling and testing program has been paid, and, if applicable, a copy of the escrow agreement.
- I. Requirements for oxygenate blenders.
  - 1. Requirement to add fuel ethanol to AZRBOB. If an oxygenate blender receives AZRBOB from a transferor to whom the oxygenate blender represents that fuel ethanol will be added to the AZRBOB, the oxygenate blender shall add fuel ethanol to the AZRBOB in the amount (or within the range of amounts) identified in the documentation accompanying the AZRBOB.
  - 2. Additional requirements for oxygenate blending at terminals. An oxygenate blender that makes Arizona CBG by blending fuel ethanol with AZRBOB in a motor fuel storage tank, other than a truck used to deliver motor fuel to a retail outlet or bulk-purchaser consumer facility, shall determine the oxygen content and volume of the Arizona CBG before shipping, by collecting and analyzing a representative sample of the Arizona CBG, using the methodology in R20-2-759.
  - 3. Additional requirements for oxygenate blending in trucks. An oxygenate blender that blends AZRBOB in a motor fuel delivery truck shall conduct quality assurance sampling and testing that meets the requirements in 40 CFR 80.69(e)(2), as it existed on July 1, 1996, except for the changes listed in subsections (I)(3)(a) through (I)(3)(c). 40 CFR 80.69(e)(2), July 1, 1996, is incorporated by reference and on file with the Department. A copy may be obtained at the U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, D.C. 20402-9328. The material incorporated includes no future editions or amendments.
    - a. 40 CFR 80.69(e)(2). The word "RBOB" is changed to read "AZRBOB;"
    - b. 40 CFR 80.69(e)(2)(iv). "... using the testing methodology specified at § 80.46 ..." is changed to read "... using the testing methodology specified in R20-2-759...;" and
- c. 40 CFR 80.69(e)(2)(v). "(within the ranges specified in § 80.70(b)(2)(I))" is changed to read "(within the ranges of the applicable test methods)."
- 4. Additional requirements for in-line oxygenate blending in pipelines using computer-controlled blending.
  - a. An oxygenate blender that produces Arizona CBG by blending fuel ethanol with AZRBOB into a pipeline using computer-controlled in-line blending shall, for each batch of Arizona CBG produced:
    - i. Obtain a flow proportional composite sample after the addition of fuel ethanol and before combining the resulting Arizona CBG with any other Arizona CBG;
    - ii. Determine the oxygen content of the Arizona CBG by analyzing the composite sample within 24 hours of blending using the methodology in R20-2-759; and
    - iii. Determine the volume of the resulting Arizona CBG.
  - b. If the test results for the Arizona CBG indicate that it does not contain the amount of fuel ethanol specified by the ranges of the applicable test methods, the oxygenate blender shall:
    - i. Notify the pipeline to downgrade the Arizona CBG to conventional gasoline or transmix upon arrival in Arizona;
    - ii. Begin an investigation to determine the cause of the noncompliance;
    - iii. Collect a representative sample every two hours during each in-line blend of AZRBOB and fuel ethanol, and analyze the samples within 12 hours of collection, until the cause of the noncompliance is determined and corrected; and
    - iv. Notify the Director in writing within one business day that the Arizona CBG does not comply with the requirements of this Article.
  - c. The oxygenate blender shall comply with subsection (I)(4)(b)(iii) until the Director determines that the corrective action has remedied the noncompliance.
- 5. Recordkeeping and records retention.
  - a. An oxygenate blender shall maintain, for five years from the date of each sampling, records of the following:
    - i. Sample date,
    - ii. Identity of blend or product sampled,
    - iii. Container or other vessel sampled,
    - iv. Volume of final blend or shipment,
    - v. Oxygen content as determined under R20-2-759, and
    - vi. Results from all testing.
  - b. The Director shall deem that Arizona CBG blended by an oxygenate blender and not tested and documented as required by this Section has an oxygen content that exceeds the standards specified in R20-2-751 or exceeds the comparable PM averaging limits, if applicable, unless the oxygenate blender demonstrates to the Director that the Arizona CBG meets the standards in R20-2-751.
  - c. Within 20 days of the Director's written request, an oxygenate blender shall provide any records maintained by the oxygenate blender under this Section. If the oxygenate blender fails to provide records requested for a blend or shipment of Arizona CBG,

the Director shall deem that the blend or shipment of Arizona CBG violates R20-2-751 or exceeds the comparable PM averaging limits, if applicable, unless the oxygenate blender demonstrates to the Director that the Arizona CBG meets the standards and limits under R20-2-751.

6. Notification requirement. An oxygenate blender shall notify the Director by fax before transporting Arizona CBG or AZRBOB into the CBG-covered area by a means other than a pipeline.
7. Quality assurance and quality control (QA/QC) program. An oxygenate blender that conducts sampling and testing under subsection (I) in the oxygenate blender's own laboratory shall develop a QA/QC program to demonstrate the accuracy and effectiveness of the oxygenate blender's sampling and testing of Arizona CBG or AZRBOB. The oxygenate blender shall submit the QA/QC program to the Director for approval at least three months before transporting Arizona CBG. The Director shall approve a QA/QC program only if the Director determines that the QA/QC program ensures that the oxygenate blender's sampling and testing produces data that are complete, accurate, and reproducible. Instead of developing a QA/QC program, an oxygenate blender may comply with the independent testing requirements of R20-2-752(F), except that, for sampling and testing conducted under subsection (I)(3), the minimum number of samples collected and tested by the independent laboratory shall be 10% of the number of samples required to be collected and tested under subsection (I).
8. An oxygenate blender that does not conduct laboratory sampling and testing required under subsection (I) in its own laboratory shall designate an independent laboratory, as described in R20-2-752(F), to conduct the sampling and testing required under subsection (I)(7).
9. Within 24 hours of the Director's or designee's written request, an oxygenate blender shall submit a duplicate of any sample collected under subsection (I)(7).
- J. Subsection (A)(1)(a) will not become effective until Arizona's revised State Implementation Plan regarding CARB 3 is approved by EPA.

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

*Editor's Note: The following Section was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt rules expired when the Section was permanently adopted with changes (Supp. 98-3).*

#### R20-2-756. Downstream Blending of Arizona CBG with Nonoxygenate Blendstocks

- A. A person shall not combine Arizona CBG supplied from a production or import facility with any nonoxygenate blendstock, other than vapor recovery condensate, unless the person demonstrates to the Director:
  1. The blendstock added to the Arizona CBG meets all of the Arizona CBG standards regardless of the fuel properties and performance standards of the Arizona CBG to which the blendstock is added; and
  2. The person meets the requirements in this Article applicable to producers of Arizona CBG.
- B. Notwithstanding subsection (A), a person may add nonoxygenate blendstock to a previously certified batch or mixture of certified batches of Arizona CBG that does not comply with one or more of the applicable per-gallon standards contained in R20-2-751(A) or (B) if the person obtains prior written approval from the Director based on a demonstration that adding the blendstock will bring the previously certified Arizona CBG into compliance with the applicable per-gallon standards for Arizona CBG. The oxygenate blender or registered supplier shall certify the re-blended Arizona CBG to the Department.

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3).

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#### R20-2-757. Product Transfer Documentation; Records Retention

- A. If a person transfers custody or title to Arizona CBG or AZRBOB, other than when Arizona CBG is sold or dispensed at a motor fuel dispensing site or fleet vehicle fueling facility, the transferor shall provide to the transferee documents that include the following:
  1. Name and address of the transferor;
  2. Name and address of the transferee;
  3. Volume of Arizona CBG or AZRBOB being transferred;
  4. Location of the Arizona CBG or AZRBOB at the time of transfer;
  5. Date of the transfer;
  6. Product transfer document number;
  7. Identification of the gasoline as Arizona CBG or AZRBOB;
  8. Minimum octane rating of the Arizona CBG or AZRBOB;
  9. For oxygenated Arizona CBG designated for sale for use in motor vehicles from November 1 through January 31,



the minimum quantity of fuel ethanol contained in the Arizona CBG; and

10. If the product transferred is AZRBOB for which fuel ethanol blending is intended:
  - a. Identification of the fuel as AZRBOB and a statement that the “AZRBOB does not comply with the standards for Arizona CBG without the addition of fuel ethanol;”
  - b. Designation of the AZRBOB as suitable for blending with fuel ethanol;
  - c. Fuel ethanol amount or range of amounts that the AZRBOB requires to meet the fuel properties or performance standards claimed by the registered supplier of the AZRBOB, and the applicable specifications for volume percent fuel ethanol and weight percent oxygen content; and
  - d. Instructions to the transferee that the AZRBOB may not be combined with any other AZRBOB unless the other AZRBOB has the same requirements for fuel ethanol amount or range of amounts.
- B. A registered supplier, third-party terminal, or pipeline may comply with subsection (A) by using standardized product codes on pipeline tickets if the codes are specified in a manual distributed by the pipeline to transferees of the Arizona CBG or AZRBOB, and the manual includes all required information for the Arizona CBG or AZRBOB.
- C. Any transferee in subsection (A), other than a registered supplier, oxygenate blender, third-party terminal, pipeline, motor fuel dispensing site, or fleet vehicle fueling facility shall retain product transfer documents for each shipment of Arizona CBG or AZRBOB transferred during the 24 months before the most recent transfer. The transferee shall maintain product transfer documents for the 30 days before the most recent transfer at the business address listed on the product transfer document. The transferee may maintain all remaining product transfer documents for the preceding 24 months elsewhere.
- D. A motor fuel dispensing site or fleet vehicle fueling facility shall retain product transfer documents for each shipment of Arizona CBG transferred during the 12 months before the most recent transfer. The motor fuel dispensing site or fleet vehicle fueling facility shall maintain product transfer documents for the three most recent transfers on the premises. The motor fuel dispensing site or fleet vehicle fueling facility may maintain the remaining product transfer documents for the preceding 12 months elsewhere.
- E. A registered supplier, oxygenate blender, third-party terminal, or pipeline shall retain product transfer documents for each shipment of Arizona CBG or AZRBOB transferred during the 60 months before the most recent transfer. The transferee shall maintain product transfer documents for each shipment of Arizona CBG or AZRBOB transferred during the 30 days preceding the most recent transfer at the business address listed on the product transfer document. The transferee may maintain all remaining product transfer documents for the preceding 60 months elsewhere.
- F. When a person transfers custody or title of fuel ethanol that is intended for use as a blend component in AZRBOB or Arizona CBG, the person shall provide the transferee a document that prominently states that the fuel ethanol complies with the standards for fuel ethanol intended for use as a blend component in AZRBOB or Arizona CBG.
- G. Upon request by the Director or designee, a person shall present product transfer documents to the Department within two working days of the request. Legible photocopies of the product transfer documents are acceptable.

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

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#### R20-2-758. Repealed

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Section repealed by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

*Editor's Note: The following Section was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt rules expired when the Section was permanently adopted with changes (Supp. 98-3).*

#### R20-2-759. Testing Methodologies

- A. Except as provided in subsection (C), a registered supplier or importer certifying Arizona CBG or AZRBOB as meeting the requirements of this Article shall use one of the methods listed in Table A. A copy of the EPA- or CARB-approved ASTM methods may be obtained at: American Society for Testing and Materials, 100 Bar Harbor Drive, West Conshohocken, PA 19428-2959. A copy of the CARB methods may be obtained at: California Air Resources Board, P.O. Box 2815, Sacramento, CA 95812.
- B. An oxygenate blender or third-party terminal certifying Arizona CBG or AZRBOB before transport to the CBG-covered area shall measure fuel ethanol in accordance with the oxygenate blender's or third-party terminal's approved QA/QC pro-

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- gram or in accordance with one of the methods listed in Table A.
- C. Rather than using a method listed in Table A to certify Arizona CBG or AZRBOB, a registered supplier may use the CARBOB Model and use the fuel-quality measures calculated using the CARBOB Model for compliance and reporting purposes.
- D. A test method that the Department determines is equivalent to those listed in Table A may be used to certify Arizona CBG or AZRBOB. The Department has determined that test methods approved by either the EPA or CARB are equivalent test methods. To determine whether a proposed test method is equivalent to those listed in Table A, the Department shall thoroughly review data from both the proposed and designated test methods and assess whether the accuracy and precision of the proposed method is equal to or better than the accuracy and precision of the designated method and whether there is significant bias between the two methods. The Department shall approve a proposed test method only if the Department determines that the accuracy and precision of the proposed test method is equal to or better than the accuracy and precision of the designated method. A correlation equation may be

required to align the two methods. If a correlation equation is required to align the two methods, the correlation equation becomes part of the equivalent method.

- E. Subsections (C) and (D) will not become effective until Arizona's revised State Implementation Plan regarding CARB 3 is approved by EPA.

**Historical Note**

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 7 A.A.R. 1025, effective February 9, 2001 (Supp. 01-1). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

**Table A. Arizona Department of Weights and Measures Test Methods for Arizona CBG and AZRBOB**

Fuel Parameter	Units	EPA-approved Test Method	EPA-approved Reproducibility	CARB-approved Test Method	CARB-approved Reproducibility
Aromatics	V%	D 5769-98			
	V%	D 1319-02a <sup>A</sup>	1.65	D 5580-00	1.4
Benzene	V%	D 3606-99	0.21	D 5580-00	0.1409 (X) <sup>1.133</sup>
Olefins	V%	D 1319-02a	0.32 (x) <sup>0.5</sup>	D 6550-00	0.32 (X) <sup>0.5</sup> ; Footnote 1
Oxygenates	W%	D 5599-00	See test method	D 4815-99	See test method
	W%	D 4815-99 <sup>B</sup>	See test method		
Vapor Pressure (Correlation Equation) Footnote 2	psi	D 5191-01	0.3	13 CCR Section 2297	0.21
Sulfur	wppm	D 2622-98		D 5453-93	0.2217 (x) <sup>0.92</sup> wppm
				D 2622-94 (modified)	10-30 wppm R=0.405 (x) > 30 wppm R =0.192 (x)
Distillation T50	deg F	D 86-01	See test method	D 86-99ae1	See test method
Distillation T90	deg F	D 86-01	See test method	D 86-99ae1	See test method

<sup>A</sup> A refinery or importer may determine aromatics content using ASTM D 1319-02a if the result is correlated to ASTM D 5769-98.

<sup>B</sup> A refinery or importer may determine oxygenate content using ASTM D 4815-99 if the result is correlated to ASTM D 5599-00.

Footnotes:

1. Replace the last sentence in ASTM D 6550-00 Section 1.1 with the following: "The application range is from 0.3 to 25 mass percent total olefin, as defined in Section 2263(b), Title 13, California Code of Regulations. If olefin concentrations are not detected, substitute one-half of the detection limit."

2. When determining RVP, the only correlation equation to be used is the CARB (RVP= (0.972 X Ptot) – 0.715).

**Historical Note**

New Table A made by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

**Editor's Note:** The following Section was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these

rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide

*reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt rules expired when the Section was permanently adopted with changes (Supp. 98-3).*

#### **R20-2-760. Compliance Surveys**

- A.** A registered supplier that elects to certify that Arizona CBG or AZRBOB meets an averaging standard under R20-2-751 shall ensure that compliance surveys are conducted in accordance with a compliance survey program plan approved by the Director. The Director shall approve a compliance survey program plan if it:
  - 1. Consists of at least four VOC and NOx surveys conducted at least one per month between May 1 through September 15 of each year; and
  - 2. Complies with subsection (J).
- B.** If a registered supplier fails to ensure that an approved compliance survey program is conducted, the Director shall issue an order requiring the registered supplier to comply with all applicable fuel property and performance standards on a per-gallon basis for six months or through the end of the survey period identified in subsection (A)(1), whichever is longer. Regardless of when a failure to survey occurs, the Director's order shall require compliance with per-gallon standards from the beginning of the survey period during which the failure to survey occurs.
- C.** General compliance survey requirements. A registered supplier shall ensure that a compliance survey conforms to the following:
  - 1. Consists of all samples that are collected under an approved survey program plan during any consecutive seven days and that are not excluded under subsection (C)(4);
  - 2. Is representative of all Arizona CBG being dispensed in the CBG-covered area as provided in subsection (G);
  - 3. Analyzes each sample included in the compliance survey for oxygenate type and content, olefins, sulfur, aromatic hydrocarbons, E200, E300, and RVP according to the test methods in R20-2-759. RVP is required to be analyzed only from May 1 through September 15;
  - 4. Bases the results of the compliance survey upon an analysis of each sample collected during the course of the compliance survey, unless a sample does not comply with the applicable per gallon maximum or minimum fuel property standard being evaluated in addition to any reproducibility that applies to the fuel property standard; and
  - 5. If a laboratory analyzes the compliance survey samples, the laboratory participates in a correlation program with the Director to ensure the validity of analysis results.
- D.** If the Director determines that a sample used in a compliance survey does not comply with R20-2-751 or another requirement under this Article, the Director shall take enforcement action against the registered supplier.
- E.** A registered supplier shall comply with the following VOC and NOx compliance survey requirements:
  - 1. For each compliance survey sample, determine the VOC and NOx emissions reduction percentage based upon the tested fuel properties for that sample using the methodology for calculating VOC and NOx emissions reductions at 40 CFR 80.45, as incorporated by reference in R20-2-702;
  - 2. The CBG-covered area fails a VOC compliance survey if the VOC emissions reduction percentage average of all samples collected during the compliance survey is less than the per-gallon standard for VOC emissions reduction percentage in Table 1, column A.
  - 3. The CBG-covered area fails a NOx compliance survey if the NOx emissions reduction percentage average of all samples collected during the compliance survey is less than the per-gallon standard for NOx emissions reduction percentage in Table 1, column A.
- F.** A registered supplier shall determine the result of the series of NOx compliance surveys conducted between May 1 and September 15 as follows:
  - 1. For each compliance survey sample, the NOx emissions reduction percentage is determined based upon the tested fuel properties for that sample using the methodology for calculating NOx emissions reduction at 40 CFR 80.45, as incorporated by reference in R20-2-702; and
  - 2. The CBG-covered area fails the NOx series of compliance surveys conducted between May 1 and September 15 if the NOx emissions reduction percentage average for all compliance survey samples collected during that time is less than the Federal Complex Model per-gallon standard for the NOx emissions reduction percentage in Table 1, column A.
- G.** General requirements for an independent surveyor conducting a compliance survey. A registered supplier may have the compliance surveys required by this Section conducted by an independent surveyor. The Director shall approve a compliance survey program conducted by an independent surveyor if the compliance survey program:
  - 1. Is designed and conducted by a surveyor that is independent of the registered supplier. To be considered independent:
    - a. The surveyor shall not be an employee of any registered supplier,
    - b. The surveyor shall not have an obligation to or interest in any registered supplier, and
    - c. The registered supplier shall not have an obligation to or interest in the surveyor;
  - 2. Includes enough samples to ensure that the average levels of oxygen, RVP, aromatic hydrocarbons, olefins, T50, T90, and sulfur are determined with a 95% confidence level, with error of less than 0.1 psi for RVP, 0.1% for oxygen (by weight), 0.5% for aromatic hydrocarbons (by volume), 0.5% for olefins (by volume), 5°F. for T50 and T90, and 10 wppm for sulfur;
  - 3. Requires that the surveyor not provide advance notice, except as provided in subsection (H), of the date or location of any survey sampling;
  - 4. Requires that the surveyor provide a duplicate of any sample taken during the survey, with information regarding the name and address of the facility from and the date on which the sample was taken, upon request of the Director, within 30 days following submission of the survey report required under subsection (G)(6);
  - 5. Requires that the surveyor permit a Department official to monitor sample collection, transportation, storage, and analysis at any time;
  - 6. Requires the surveyor to submit a report of each survey to the Director within 30 days after sampling for the survey is completed that includes the following information:
    - a. Name of the person conducting the survey;
    - b. Attestation by an officer of the surveyor that the sampling and testing was conducted according to the compliance survey program plan and the results are accurate;
    - c. Identification of the registered supplier for whom the compliance survey was conducted if the compliance survey was conducted for only one registered supplier;
    - d. Identification of the area from which survey samples were selected;



- e. Dates on which the survey was conducted;
  - f. Address of each facility at which a sample was collected, and the date of collection;
  - g. Results of the analysis of samples for oxygenate type and oxygen weight percent, aromatic hydrocarbon, and olefin content, E200, E300, and RVP, and the calculated VOC or NOx emissions reduction percentage, as applicable, for each survey conducted during the period identified in subsection (A)(1);
  - h. Name and address of each laboratory at which samples were analyzed;
  - i. Description of the method used to select the facilities from which a sample was collected;
  - j. Number of samples collected from each facility;
  - k. Justification for excluding a collected sample from the survey, if one was excluded; and
  - l. Average VOC and NOx emissions reduction percentage.
- H.** An independent surveyor shall begin each survey on a date selected by the Director. The Director shall notify the surveyor of the date selected at least 10 business days before the survey is to begin.
- I.** To obtain the Director's approval of a compliance survey program plan, the person seeking approval shall:
- 1. Submit the plan to the Director no later than January 1 to cover the survey period of May 1 through September 15 of each year; and
  - 2. Have the plan signed by a corporate officer of the registered supplier or by an officer of the independent surveyor.
- J.** No later than April 1 of each year, a registered supplier that intends to meet the requirements in subsection (A) by contracting with an independent surveyor to conduct the compliance survey plan for the next summer and winter season shall enter into the contract and pay all of the money necessary to conduct the compliance survey plan. The registered supplier may pay the money necessary to conduct the compliance survey plan to the independent surveyor or to an escrow account with instructions to the escrow agent to release the money to the independent surveyor as the compliance survey plan is implemented. No later than April 15, the registered supplier shall submit to the Director a copy of the contract with the independent surveyor, proof that the money necessary to conduct the compliance survey plan has been paid, and, if applicable, a copy of the escrow agreement.

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 7 A.A.R. 1025, effective February 9, 2001 (Supp. 01-1). Amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

**Editor's Note:** *The following Section was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Admin-*

*istrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt rules expired when the Section was permanently adopted with changes (Supp. 98-3).*

#### R20-2-761. Liability for Noncompliant Arizona CBG or AZRBOB

- A.** Persons liable. If motor fuel designated as Arizona CBG or AZRBOB does not comply with R20-2-751, the following are liable for the violation:
- 1. Each person who owns, leases, operates, controls, or supervises a facility where the noncompliant Arizona CBG or AZRBOB is found;
  - 2. Each registered supplier whose corporate, trade, or brand name, or whose marketing subsidiary's corporate, trade, or brand name, appears at a facility where the noncompliant Arizona CBG or AZRBOB is found; and
  - 3. Each person who manufactured, imported, sold, offered for sale, dispensed, supplied, offered for supply, stored, transported, or caused the transportation of any gasoline in a storage tank containing Arizona CBG or AZRBOB found to be noncompliant.
- B.** Defenses.
- 1. A person who is otherwise liable under subsection (A) is not liable if that person demonstrates:
    - a. That the violation was not caused by the person or person's employee or agent;
    - b. That product transfer documents account for all of the noncompliant Arizona CBG or AZRBOB and indicate that the Arizona CBG or AZRBOB complied with this Article; and
    - c. That the person had a quality assurance sampling and testing program, as described in subsection (C) in effect at the time of the violation; except that any person who transfers Arizona CBG or AZRBOB, but does not assume title, may rely on the quality assurance program carried out by another person, including the person who owns the noncompliant Arizona CBG or AZRBOB, provided the quality assurance program is properly administered.
  - 2. If a violation is found at a facility that operates under the corporate, trade, or brand name of a registered supplier, that registered supplier must show, in addition to the defense elements in subsection (B)(1), that the violation was caused by:
    - a. A violation of law other than A.R.S. Title 41, Chapter 15, Article 6, this Article, or an act of sabotage or vandalism;
    - b. A violation of a contract obligation imposed by the registered supplier designed to prevent noncompliance, despite periodic compliance sampling and testing by the registered supplier; or
    - c. The action of any person having custody of Arizona CBG or AZRBOB not subject to a contract with the registered supplier but engaged by the registered supplier for transportation of Arizona CBG or AZRBOB, despite specification or inspection of procedures and equipment by the registered supplier designed to prevent violations.
  - 3. To show that the violation was caused by any of the actions in subsection (B)(2), the person must demonstrate by reasonably specific showings, by direct or circumstantial evidence, that the violation was caused or must have been caused by another person.
- C.** Quality assurance sampling and testing program. To demonstrate an acceptable quality assurance program for Arizona

CBG or AZRBOB, at all points in the gasoline distribution network, other than at a service station or fleet owner facility, a person shall present evidence:

1. Of a periodic sampling and testing program to determine compliance with the maximum or minimum standards in R20-2-751; and
2. That each time Arizona CBG or AZRBOB is noncompliant with one of the requirements in R20-2-751:
  - a. The person immediately ceases selling, offering for sale, dispensing, supplying, offering for supply, storing, transporting, or causing the transportation of the noncompliant Arizona CBG or AZRBOB; and
  - b. The person remedies the violation as soon as practicable.

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3).

**Editor's Note:** *The following Section was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S.*

**Title 41, Chapter 6 means the Department did not submit these rules to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish these rules in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the rules (Supp. 97-3). The exempt rules expired when the Section was permanently adopted with changes (Supp. 98-3).**

#### R20-2-762. Penalties

Any person who violates any provision of this Article is subject to the following:

1. Prosecution for a Class 2 misdemeanor under A.R.S. § 41-2113(B)(4);
2. Civil penalties in the amount of \$500 per violation under A.R.S. § 41-2115; and
3. Stop-use, stop-sale, hold, and removal orders under A.R.S. § 41-2066(A)(2).

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Section permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3).



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**Table 1. Type 1 Arizona CBG Standards**

Table 1 will not become effective until Arizona's revised State Implementation Plan regarding CARB 3 and shortening the winter season is approved by EPA.

	Non-averaging Option	Averaging Option		
	A	B	C	D
Performance Standard/Fuel Property**	Per-Gallon (minimum)	Average	Minimum (per-gallon)	Maximum (per-gallon)
VOC Emission Reduction (%) May 1 - Sept. 15	≥ 27.5	≥ 29.0	≥ 25.0	N/A
NOx Emission Reduction (%) May 1 - Sept. 15	≥ 5.5	≥ 6.8	N/A	N/A
NOx Emission Reduction (%) Sept. 16 - October 31 and February 1 - April 30***	≥ 0.0	N/A	N/A	N/A
Oxygen content: fuel ethanol, (% by weight unless otherwise noted) Nov. 1 - January 31**** February 1 - October 31	N/A 0.0*	N/A N/A	N/A 0.0	N/A 3.7
Oxygen content: other than fuel ethanol, (% by weight) Nov. 1 - January 31**** February 1 - October 31	N/A 0.0	N/A N/A	N/A 0.0	N/A ****
* Maximum oxygen content shall comply with the EPA oxygenate waiver requirements and with A.R.S. § 41-2122. ** Dates represent compliance dates for the owner of a motor fuel dispensing site or a fleet vehicle fueling facility. *** A registered supplier shall certify all Arizona CBG as Type 2 Arizona CBG meeting the standards in Table 2 beginning November 1 through January 31. **** As specified in A.R.S. § 41-2122.				

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Table 1 permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 7 A.A.R. 1025, effective February 9, 2001 (Supp. 01-1). Table 1 amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

**Editor's Note:** The following Table was adopted under an exemption from the provisions of A.R.S. Title 41, Chapter 6, pursuant to Laws 1997, Chapter 117, § 3. Exemption from A.R.S. Title 41, Chapter 6 means the Department did not submit this Table to the Governor's Regulatory Review Council for review and approval. Although exempt from certain provisions of the Administrative Procedure Act, the Department was required to publish this Table in the Arizona Administrative Register and provide reasonable notice and at least one public hearing on the Table (Supp. 97-3). The exempt rules expired when the Section was permanently adopted with changes (Supp. 98-3).

**Table 2. Type 2 Arizona CBG Standards**

Table 2 will not become effective until Arizona's revised State Implementation Plan regarding CARB 3 and shortening the winter season is approved by EPA.

	Averaging Option		Non-averaging Option	
	A	B	C	
Fuel Property	Maximum Standard (per gallon)	Averaging Standard*	Flat Standard * (per gallon maximum)	Units of Standard
Sulfur Content	80/30	30/15	40/20	Parts per million by weight
Olefin Content	10.0	4.0	6.0	% by volume
90% Distillation Temperature (T90)	330	290/295	300/305	Degrees Fahrenheit
50% Distillation Temperature (T50)	220	200/203	210/213	Degrees Fahrenheit
Aromatic Hydrocarbon Content	30.0/35	22.0	25.0	% by volume
Oxygen content: fuel ethanol** Nov. 1 - January 31 February 1 - October 31 The maximum oxygen content EtOH year around	10% fuel ethanol**	-- --	10% fuel ethanol** 3.7	% by vol. % by weight
<p>* Instead of the standards in columns B and C, a registered supplier may comply with the standards contained in column A, and R20-2-751(F), (G), and (H) for the use of the PM.</p> <p>** Maximum oxygen content shall comply with the EPA oxygenate waiver requirements.</p> <p>A registered supplier shall certify all Arizona CBG using fuel ethanol as the oxygenate beginning November 1 through January 31. Alternative fuel ethanol contents not less than 2.7% total oxygen may be used if approved by the Director under A.R.S. § 41-2124(D).</p> <p>NOTES: Dates represent compliance dates for the owner of a motor fuel dispensing site or fleet vehicle fuel facility.</p> <p>Standards shown in the form of x/y denote standards for CARB Phase 2/Phase 3 gasolines.</p>				

#### Historical Note

Adopted effective under an exemption from the provisions of A.R.S. Title 41, Chapter 6, with an interim effective date of September 12, 1997 (Supp. 97-3). Interim adoption expired and was automatically repealed on the date the permanent rules became effective pursuant to Laws 1997, Ch. 117; Table 2 permanently adopted with changes October 1, 1998; filed in the Office of the Secretary of State September 9, 1998 (Supp. 98-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 5 A.A.R. 4214, effective September 22, 1999 (Supp. 99-3). Amended by final rulemaking at 7 A.A.R. 1025, effective February 9, 2001 (Supp. 01-1). Table 2 amended by final rulemaking at 12 A.A.R. 3722, effective September 12, 2006 (Supp. 06-3).

# **Appendix F**

## **Ambient Monitoring Data**

## Appendix F

### Ambient Monitoring Data

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*Except as otherwise indicated, the data presented in the following tables were derived by generating the standard AQS Application Raw Data Report (AMP501) for PM<sub>10</sub>, PM<sub>2.5</sub> and total nitrates in workfile format, importing the resulting files into an Access database table and running queries against the table.*

**Table 1**  
**Annual Nitrogen Dioxide Concentrations from Highest to Lowest**  
**for Maricopa County 2000-2006<sup>1</sup>**

Site ID	Year	Annual Arithmetic Mean ( $\mu\text{g}/\text{m}^3$ )	Percent of NAAQS	Data Recovery (%)
3010	2001	.03710	70.0%	91
3010	2000	.03630	68.5%	96
3010	2002	.03470	65.5%	97
3010	2003	.03430	64.7%	82
3010	2005	.03150	59.4%	97
3010	2004	.03140	59.2%	97
3010	2006	.03030	57.2%	92
3003	2000	.03010	56.8%	97
3002	2003	.02930	55.3%	80
3002	2002	.02930	55.3%	93
3002	2000	.02920	55.1%	94
0019	2000	.02880	54.3%	94
9997	2002	.02870	54.2%	98
3002	2001	.02860	54.0%	96
9997	2003	.02800	52.8%	99
3002	2005	.02620	49.4%	97
9997	2000	.02580	48.7%	94
0019	2001	.02560	48.3%	97
3002	2004	.02470	46.6%	95
3002	2006	.02430	45.8%	94
0019	2004	.02380	44.9%	97
9997	2005	.02350	44.3%	99
3003	2002	.02350	44.3%	96
0019	2005	.02350	44.3%	94
0019	2006	.02310	43.6%	93
9997	2004	.02300	43.4%	99
4005	2001	.02210	41.7%	85
3003	2001	.02150	40.6%	94
9997	2005	.02077	39.2%	99
9997	2006	.02030	38.3%	79
9997	2002	.01994	37.6%	98
3003	2005	.01960	37.0%	96

<sup>1</sup> Derived from a query against the Annual Summaries View in the AQS basic business area in AQS Discoverer.

Site ID	Year	Annual Arithmetic Mean ( $\mu\text{g}/\text{m}^3$ )	Percent of NAAQS	Data Recovery (%)
3003	2004	.01940	36.6%	92
9997	2003	.01922	36.3%	96
9997	2004	.01891	35.7%	98
3003	2006	.01870	35.3%	89
4011	2005	.01190	22.5%	95
4011	2004	.01100	20.8%	88
4011	2006	.01080	20.4%	90
9993	2002	.00560	10.6%	98
9993	2004	.00510	9.6%	99
9993	2003	.00490	9.2%	97

**Table 2**  
**Maximum and Average 24-Hour Nitrate Concentrations by Month**  
**for Maricopa County 2000-2006**

Month	Year	Max. Nitrate	Avg. Nitrate
November	2000	5.99	3.24
November	2001	1.61	0.83
November	2002	4.49	1.35
November	2003	11.50	2.20
November	2004	8.79	2.08
November	2005	4.13	1.13
December	2000	6.24	3.49
December	2001	6.74	4.01
December	2002	14.10	4.34
December	2003	6.35	2.11
December	2004	6.50	2.05
December	2005	9.40	3.91
January	2001	6.87	2.95
January	2002	4.27	1.94
January	2003	7.98	3.78
January	2004	5.39	2.09
January	2005	5.01	3.06
January	2006	4.00	1.70
February	2000	1.53	0.90
February	2001	5.57	2.39
February	2002	2.20	1.20
February	2003	5.29	2.87
February	2004	4.34	2.51
February	2005	6.23	1.57
February	2006	2.78	1.44
March	2000	2.10	1.20
March	2001	5.24	1.51
March	2002	2.22	0.98
March	2003	2.84	1.25
March	2004	3.00	0.87
March	2005	3.96	0.82
March	2006	5.05	0.93
April	2000	0.91	0.52
April	2001	2.83	0.98
April	2002	0.88	0.57
April	2003	1.42	0.66
April	2004	1.12	0.57
April	2005	1.67	0.52
April	2006	0.91	0.44
May	2000	0.73	0.40
May	2001	1.03	0.47

Month	Year	Max. Nitrate	Avg. Nitrate
May	2002	1.04	0.64
May	2003	1.02	0.65
May	2004	0.74	0.45
May	2005	1.26	0.37
May	2006	0.70	0.42
June	2000	0.71	0.47
June	2001	0.52	0.44
June	2002	0.74	0.48
June	2003	0.64	0.38
June	2004	0.65	0.36
June	2005	0.71	0.42
June	2006	0.48	0.31
July	2000	0.73	0.42
July	2001	1.15	0.45
July	2002	0.98	0.50
July	2003	0.95	0.57
July	2004	0.96	0.44
July	2005	0.63	0.36
July	2006	0.84	0.46
August	2000	0.37	0.29
August	2001	0.71	0.38
August	2002	0.74	0.44
August	2003	1.31	0.55
August	2004	0.46	0.30
August	2005	1.18	0.39
August	2006	0.52	0.33
September	2000	0.43	0.34
September	2001	0.56	0.40
September	2002	2.02	0.57
September	2003	1.02	0.47
September	2004	0.99	0.46
September	2005	0.77	0.36
September	2006	0.83	0.28
October	2000	2.53	0.87
October	2001	1.13	0.53
October	2002	1.71	0.81
October	2003	1.47	0.62
October	2004	5.13	1.17
October	2005	1.96	0.58
October	2006	0.44	0.33



**Table 3**  
**Correlation Between 24-Hour PM<sub>10</sub> and Nitrate at the Same Monitor**  
**for Maricopa County 2000-2006**

Site ID	Date	PM10 (µg/m <sup>3</sup> )	Nitrate (µg/m <sup>3</sup> )
9997	14-Jul-03	169.00	0.53
4009	14-Jul-03	156.70	0.47
0019	12-Dec-05	155.00	7.51
4009	24-Oct-03	154.00	1.47
8006	14-Jul-03	145.40	0.53
9997	18-Dec-05	138.20	4.20
4009	15-May-03	134.30	0.88
9997	15-May-03	131.20	1.02
4009	21-May-03	124.90	0.68
4009	30-Oct-03	121.90	1.18
4009	05-Dec-03	121.10	2.90
7020	21-Jul-05	119.10	0.51
8006	15-May-03	114.50	0.75
9997	16-Oct-01	108.70	0.50
4009	16-Mar-04	103.60	0.84
0019	24-Dec-05	102.90	5.53
7020	21-Jun-05	102.70	0.34
7020	12-Dec-05	102.50	1.81
7020	16-Jul-06	101.80	0.47
0019	13-Aug-04	100.10	0.34
8006	27-May-04	99.90	0.73
4009	17-Dec-03	98.30	1.06
4009	18-Sep-03	94.70	0.33
4009	05-Nov-03	91.60	2.65
0019	30-Dec-05	89.90	5.35
8006	10-Mar-04	89.60	0.54
7020	16-Feb-06	87.40	1.95
4009	11-Dec-03	86.80	4.16
4009	09-Feb-04	86.10	3.00
7020	01-Sep-05	85.60	0.37
8006	21-May-03	84.70	0.55
7020	07-Oct-05	84.30	0.33
7020	06-Dec-05	84.10	2.20
9997	04-Aug-00	83.70	0.33
8006	05-Dec-03	83.50	2.38
7020	11-Jan-06	82.50	0.75
4009	06-Oct-03	82.40	0.54
7020	02-Aug-05	81.40	0.34
4009	02-Jun-03	80.90	0.37
0019	06-Dec-05	80.10	2.41
9997	22-Aug-00	78.60	0.37

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
4009	27-May-03	78.50	0.74
7020	10-Feb-06	78.10	2.69
0019	18-Dec-05	77.80	4.69
4009	18-Oct-03	77.10	0.71
8006	24-Oct-03	75.90	0.68
7020	26-Sep-06	75.50	0.26
4009	08-Jul-03	75.40	0.52
4009	29-Dec-03	73.90	1.75
4009	30-Sep-03	73.80	0.46
8006	30-Oct-03	73.60	1.13
8006	18-Oct-03	72.40	0.44
7020	17-Jan-06	72.30	1.06
9997	17-Sep-02	72.30	0.51
0019	05-Nov-04	72.00	0.40
7020	18-Nov-05	71.60	0.09
7020	22-Apr-05	71.60	0.87
7020	05-Jan-06	71.40	0.54
7020	30-Dec-05	70.60	1.76
4009	23-Dec-03	70.50	0.55
4009	13-Aug-03	69.40	0.36
4009	07-Aug-03	69.40	0.54
9997	16-Jul-06	68.80	0.47
8006	26-Jun-03	68.60	0.43
9997	21-May-03	68.50	0.56
4009	09-Apr-03	68.40	0.56
4009	20-Jun-03	68.10	0.42
4009	26-Jun-03	67.80	0.54
0019	21-Jun-05	67.70	0.37
4009	10-Mar-04	67.70	0.75
7020	30-Nov-05	67.10	1.58
7020	04-Feb-06	66.00	0.64
7020	16-Apr-05	66.00	0.57
8006	05-Nov-03	65.90	2.13
0019	11-Dec-04	65.90	2.72
4009	28-Jan-04	64.50	4.11
7020	23-Jan-06	63.60	0.20
7020	19-Sep-05	63.10	0.28
7020	06-Mar-06	62.90	1.36
9997	16-Feb-06	62.40	1.38
8006	27-May-03	62.20	0.64
4009	09-May-03	61.60	0.87
0019	13-Oct-05	61.50	1.96
0019	11-Mar-05	60.90	0.80
9997	14-Dec-00	60.80	2.88

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
9997	06-Nov-05	60.70	0.77
9997	02-Dec-00	60.40	1.21
0019	06-Nov-05	60.40	0.79
9997	11-Jan-06	60.30	1.37
8006	27-Apr-04	60.00	0.41
7020	18-Dec-05	60.00	1.80
0019	16-Jan-05	59.50	3.30
8006	08-Jul-03	59.20	0.51
7020	28-Feb-06	59.20	0.62
9997	30-Nov-05	59.10	4.13
0019	22-Apr-05	59.00	1.10
0019	18-Sep-04	58.10	0.29
8006	11-Dec-03	57.80	4.13
0019	20-Jul-04	57.70	0.46
9997	10-Sep-01	57.50	0.55
9997	27-Dec-01	57.50	5.34
0019	16-Apr-05	57.30	0.84
4009	06-Sep-03	57.20	0.38
7020	22-Feb-06	57.20	1.22
9997	09-Aug-06	57.10	0.22
0019	21-Jul-05	57.00	0.37
7020	15-Jun-05	56.60	0.57
0019	06-Oct-04	56.50	0.41
4009	20-Jul-03	56.30	0.49
7020	07-Sep-05	56.20	0.17
4009	11-Nov-03	56.00	1.49
7020	16-Jun-06	56.00	0.29
0019	24-Nov-05	55.90	1.95
7020	13-Oct-05	55.80	0.17
9997	24-Dec-05	55.70	4.92
4009	15-Feb-04	55.60	4.25
0019	31-Oct-05	55.60	0.51
0019	24-Sep-04	55.40	0.76
9997	30-Dec-05	55.40	5.12
9997	06-Dec-05	55.30	2.30
7020	13-Sep-05	55.20	0.31
0019	15-Feb-05	55.20	6.23
7020	15-Jul-05	55.10	0.37
0019	18-Nov-05	55.00	0.19
4009	12-Sep-03	54.90	0.50
7020	04-Apr-05	54.80	0.35
9997	15-Jan-03	54.80	7.98
7020	11-May-06	54.50	0.56
7020	01-Oct-05	54.40	0.27

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
7020	24-Dec-05	54.10	2.05
9997	01-Aug-03	53.90	0.66
0019	27-Apr-04	53.10	0.35
9997	20-Dec-00	52.40	3.44
9997	09-Nov-01	52.40	0.28
7020	14-Sep-06	52.40	0.16
9997	21-Jul-05	52.30	0.41
4009	14-Jun-03	52.00	0.31
9997	16-Dec-02	52.00	1.83
7020	24-Nov-05	51.90	0.96
0019	01-Sep-05	51.90	0.56
4009	02-Jul-03	51.80	0.52
0019	01-Aug-04	51.70	0.37
9997	02-Aug-05	51.40	0.33
7020	27-Jul-05	51.30	0.26
9997	02-Feb-03	51.30	1.00
0019	19-Sep-05	51.00	0.36
8006	02-Jul-03	51.00	0.50
9997	30-Oct-03	50.90	1.24
7020	23-May-06	50.70	0.32
0019	01-Oct-05	50.30	0.34
7020	16-May-05	50.10	0.31
9997	24-Nov-05	50.00	1.78
9997	29-Jul-00	49.80	0.68
0019	31-Aug-04	49.70	0.36
9997	05-Dec-03	49.60	1.86
7020	26-Aug-05	49.60	0.29
4009	21-Feb-04	49.20	3.10
8006	30-Sep-03	49.20	0.41
0019	12-Nov-05	49.10	1.43
8006	20-Jul-03	49.00	0.48
0019	27-May-04	48.90	0.69
7020	03-Aug-06	48.70	0.36
4009	03-Feb-04	48.70	2.29
8006	02-Jun-03	48.70	0.35
8006	21-Apr-04	48.40	1.12
7020	05-Apr-06	48.40	0.18
9997	21-Nov-01	48.10	1.02
0019	07-Oct-05	48.00	0.26
9997	26-Jul-03	47.80	0.75
8006	16-Jan-04	47.60	2.14
9997	17-Jun-00	47.60	0.68
7020	22-Jun-06	47.40	0.48
0019	04-Apr-05	47.30	0.38

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
7020	10-Jul-06	47.20	0.41
7020	31-Oct-05	46.90	0.31
9997	01-Feb-06	46.80	2.78
8006	03-May-04	46.80	0.06
9997	05-Sep-02	46.60	0.73
7020	29-Jan-06	46.50	3.14
9997	25-Feb-02	46.50	1.32
0019	15-May-04	46.40	0.49
0019	16-May-05	46.30	0.43
9997	24-Oct-03	46.20	0.50
7020	17-Apr-06	46.20	0.40
4009	03-May-03	45.70	0.24
9997	23-Jul-00	45.70	0.46
0019	02-Jun-04	45.60	0.45
4009	22-Mar-03	45.50	1.81
7020	06-Nov-05	45.50	0.48
9997	01-Jul-02	45.30	0.39
9997	20-Nov-00	45.20	2.07
7020	20-Sep-06	44.90	0.30
9997	22-Feb-06	44.90	1.88
7020	22-Jul-06	44.90	0.20
7020	04-Jun-06	44.80	0.38
4009	21-Apr-03	44.80	0.73
0019	17-Mar-05	44.70	1.77
7020	09-Jun-05	44.70	0.39
9997	03-Dec-01	44.40	2.74
9997	22-Apr-05	44.30	0.81
7020	11-Apr-06	44.20	0.45
9997	21-Aug-06	44.10	0.34
7020	09-Jul-05	44.10	0.35
0019	28-Jan-05	44.00	3.44
0019	11-Nov-04	44.00	2.74
9997	08-Dec-00	43.60	4.61
4009	17-Nov-03	43.60	2.54
8006	20-Jun-03	43.60	0.30
9997	27-Sep-00	43.60	0.39
8006	09-May-03	43.30	0.80
0019	03-May-04	43.10	0.28
8006	06-Oct-03	43.10	0.35
9997	02-Nov-00	42.80	3.31
9997	13-Oct-05	42.60	0.42
7020	25-Sep-05	42.60	0.22
9997	11-May-06	42.60	0.70
7020	29-Apr-06	42.50	0.53

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
0019	14-Jun-04	42.50	0.31
8006	16-Mar-04	42.40	0.47
0019	22-May-05	42.30	0.40
9997	20-May-02	42.30	0.52
8006	14-Jun-03	42.20	0.39
7020	03-Jun-05	42.20	0.49
9997	27-Mar-02	42.10	2.22
9997	04-Dec-02	42.00	14.10
9997	07-Jun-02	41.90	0.53
9997	30-May-00	41.90	0.23
4009	26-Jul-03	41.80	0.58
9997	07-Jan-01	41.80	6.87
8006	08-Jun-04	41.80	0.40
8006	15-May-04	41.60	0.49
4009	08-Jun-03	41.60	0.37
0019	22-Jan-05	41.40	5.01
9997	20-Jul-03	41.40	0.66
0019	09-Feb-05	41.30	1.01
7020	27-Jun-05	41.30	0.30
9997	03-Nov-01	41.30	0.50
7020	22-May-05	41.20	0.26
7020	05-May-06	41.20	0.67
8006	26-Jul-03	41.20	0.54
9997	10-Feb-06	41.20	2.42
9997	26-Nov-00	41.20	4.17
8006	23-Dec-03	41.20	0.37
9997	17-Jan-06	40.80	1.97
7020	10-Jun-06	40.70	0.22
8006	22-Mar-04	40.60	0.30
9997	28-Sep-01	40.60	0.40
9997	19-Apr-01	40.50	0.83
8006	29-Nov-03	40.40	0.50
0019	23-Dec-04	40.10	1.08
9997	13-Aug-03	40.00	0.38
0019	08-Jun-04	39.90	0.42
7020	12-Nov-05	39.90	0.72
9997	18-Aug-02	39.60	0.47
9997	20-Mar-01	39.40	0.70
9997	22-Dec-02	39.10	5.11
9997	07-May-01	39.10	0.57
7020	24-Mar-06	38.90	0.25
8006	28-Mar-04	38.90	0.52
4009	29-Nov-03	38.90	0.56
4009	25-Aug-03	38.90	0.34

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
9997	12-Apr-00	38.80	0.44
9997	27-May-03	38.70	0.60
7020	23-Apr-06	38.50	0.44
9997	02-Jul-03	38.50	0.60
0019	02-Jul-04	38.30	0.20
8006	11-Nov-03	38.10	0.97
9997	01-Jun-02	38.10	0.36
9997	27-Jan-03	38.10	0.80
8006	14-Jun-04	37.90	0.40
9997	22-Sep-01	37.80	0.38
9997	28-Dec-02	37.70	1.95
0019	21-Apr-04	37.70	0.85
7020	04-May-05	37.60	0.34
0019	15-Jul-05	37.60	0.43
9997	16-Jan-05	37.60	3.26
9997	21-Mar-02	37.50	0.31
9997	22-Oct-01	37.50	0.53
9997	05-Nov-03	37.40	2.07
8006	28-Jan-04	37.30	2.90
0019	12-Sep-04	37.20	0.78
9997	03-Oct-00	37.10	0.47
9997	03-Jan-03	37.00	0.70
7020	21-Aug-06	36.90	0.41
9997	26-Apr-02	36.90	0.36
9997	05-Oct-02	36.90	1.43
9997	26-Jun-03	36.90	0.48
7020	04-Jul-06	36.80	0.84
9997	15-Nov-01	36.80	0.60
9997	11-Dec-03	36.70	4.20
8006	17-Nov-03	36.70	2.58
8006	08-Jun-03	36.70	0.33
9997	25-Apr-01	36.60	0.28
9997	25-Jun-02	36.30	0.44
9997	12-May-00	36.30	0.43
9997	16-May-05	36.30	0.34
0019	08-Jul-04	36.10	0.00
7020	28-May-05	36.10	0.23
0019	07-Sep-05	36.00	0.24
4009	27-Feb-04	35.80	1.62
0019	26-Jun-04	35.60	0.36
9997	07-Oct-05	35.40	0.25
9997	23-Jan-06	35.40	0.91
9997	17-Oct-02	35.40	0.62
9997	06-Jun-01	35.40	0.47

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
9997	02-May-02	35.30	0.93
9997	01-Oct-05	35.20	0.37
9997	18-Jun-01	35.20	0.46
9997	24-Apr-00	35.20	0.54
9997	08-May-02	35.20	0.80
8006	04-Jan-04	35.10	2.13
9997	04-Jun-06	35.00	0.33
0019	09-Jun-05	35.00	0.44
9997	29-Aug-01	34.70	0.71
9997	05-Apr-06	34.70	0.17
9997	09-Jun-05	34.60	0.43
9997	24-Aug-02	34.60	0.47
9997	23-Aug-01	34.50	0.40
0019	12-Oct-04	34.50	0.50
9997	15-Feb-05	34.30	5.29
9997	01-May-01	34.30	0.49
9997	28-Feb-06	34.20	0.87
9997	18-Sep-03	34.10	0.24
7020	25-Oct-05	34.00	0.21
9997	19-Jan-01	33.90	3.27
9997	13-Jul-02	33.90	0.41
8006	26-Jun-04	33.80	0.29
9997	15-Jul-05	33.80	0.43
0019	21-May-04	33.80	0.38
0019	25-Sep-05	33.80	0.26
9997	04-Nov-02	33.70	1.42
0019	27-Jul-05	33.70	0.26
9997	31-Jul-02	33.50	0.98
9997	16-Sep-05	33.50	0.32
8006	21-Feb-04	33.40	2.48
9997	20-Apr-02	33.30	0.58
7020	30-Mar-06	33.20	0.70
9997	10-Jan-05	33.20	3.54
9997	02-Jun-03	32.90	0.60
9997	20-Jun-03	32.90	0.36
0019	27-Jun-05	32.90	0.20
0019	30-Sep-04	32.90	0.48
9997	08-Feb-03	32.80	3.72
4009	12-Oct-03	32.80	0.85
0019	04-May-05	32.80	0.35
9997	30-Sep-03	32.70	0.45
9997	11-Oct-02	32.60	0.36
9997	06-Feb-01	32.60	1.55
8006	09-May-04	32.50	0.48



Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
9997	29-Nov-03	32.50	0.81
9997	28-Oct-01	32.50	0.64
0019	15-Jun-05	32.30	0.43
9997	17-Apr-06	32.20	0.36
9997	26-Sep-06	32.20	0.26
9997	29-Dec-03	32.10	2.05
9997	24-May-00	32.10	0.33
9997	18-Feb-01	32.00	5.57
7020	03-Jul-05	32.00	0.48
9997	24-Jul-01	31.90	0.37
0019	13-Sep-05	31.80	0.36
0019	18-Oct-04	31.80	0.83
8006	03-Feb-04	31.70	1.73
7020	20-Aug-05	31.70	0.11
9997	23-Sep-02	31.70	0.26
0019	17-Nov-04	31.70	3.98
9997	18-May-00	31.70	0.31
8006	15-Apr-04	31.40	0.29
8006	06-Sep-03	31.40	0.41
9997	07-Aug-03	31.40	0.46
9997	01-Apr-01	31.40	0.75
9997	30-Jun-01	31.40	0.43
9997	10-Oct-01	31.30	0.52
9997	04-Apr-05	31.30	0.33
9997	17-Aug-01	31.10	0.43
9997	12-Jun-01	31.10	0.47
9997	09-May-03	31.00	0.97
4009	19-Aug-03	31.00	1.16
4009	27-Apr-03	31.00	0.54
9997	08-Jul-03	30.90	0.51
9997	20-Feb-03	30.70	4.35
0019	17-Dec-04	30.70	0.32
9997	05-May-06	30.50	0.67
0019	06-Sep-04	30.40	0.38
9997	14-Apr-02	30.40	0.71
9997	26-Aug-05	30.30	0.38
9997	10-May-05	30.20	0.27
9997	06-Oct-03	30.20	0.33
9997	22-Sep-05	30.20	0.34
0019	09-Jul-05	30.20	0.41
8006	29-Dec-03	30.20	1.33
9997	15-Jun-05	30.00	0.41
9997	26-Mar-01	29.80	0.81
9997	10-Dec-02	29.70	1.53

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
0019	20-Jun-04	29.70	0.18
0019	23-Mar-05	29.60	0.48
9997	30-Aug-02	29.50	0.45
7020	16-Aug-06	29.50	0.39
9997	25-Aug-03	29.50	0.33
0019	09-May-04	29.50	0.44
9997	31-Oct-05	29.40	0.40
8006	02-Jun-04	29.40	0.42
9997	03-Aug-06	29.40	0.37
0019	24-Oct-04	29.30	2.90
9997	20-Sep-06	29.30	0.24
9997	21-Sep-00	29.30	0.43
9997	06-May-00	29.20	0.33
9997	10-Mar-03	29.10	1.16
9997	09-Jul-05	29.10	0.41
9997	22-May-05	29.10	0.42
9997	11-Jun-00	29.10	0.38
8006	21-Apr-03	29.00	0.69
9997	08-Apr-02	29.00	0.74
9997	31-May-01	28.90	0.36
8006	12-Oct-03	28.90	0.49
9997	14-Jun-03	28.90	0.30
0019	09-Apr-04	28.80	0.95
7020	10-May-05	28.80	0.22
4009	28-Mar-03	28.70	0.32
0019	28-Mar-04	28.60	0.06
9997	17-Dec-03	28.60	1.18
9997	11-Mar-05	28.60	0.62
8006	27-Feb-04	28.50	2.15
9997	09-Jan-03	28.50	6.36
9997	08-Jun-03	28.50	0.34
9997	12-Sep-03	28.40	0.28
8006	20-Jun-04	28.40	0.20
9997	22-Jul-06	28.40	0.22
9997	12-Feb-01	28.30	1.76
9997	15-Oct-00	28.30	0.99
9997	16-Jun-06	28.20	0.24
9997	13-Apr-01	28.20	1.78
8006	03-May-03	28.10	0.22
9997	30-Apr-00	28.00	0.29
8006	09-Apr-04	28.00	0.89
9997	25-Sep-05	28.00	0.28
0019	28-May-05	27.90	0.35
9997	18-Oct-03	27.70	0.37

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
9997	23-Apr-06	27.60	0.49
9997	16-Aug-00	27.60	0.25
9997	05-Jul-00	27.30	0.32
9997	29-Apr-06	27.20	0.68
9997	23-May-06	27.20	0.28
7020	27-Aug-06	27.10	0.33
9997	03-Jul-05	27.00	0.58
7020	14-Aug-05	26.90	0.21
0019	07-Aug-04	26.80	0.23
9997	08-Nov-00	26.70	1.73
9997	09-Mar-02	26.60	1.22
9997	29-May-06	26.60	0.30
7020	17-May-06	26.60	0.15
9997	25-Jul-02	26.50	0.44
9997	04-May-05	26.30	0.39
9997	04-Sep-01	26.30	0.25
4009	15-Apr-03	26.30	0.34
9997	19-Jul-02	26.20	0.39
9997	04-Jul-06	26.20	0.75
8006	10-Jan-04	26.20	0.31
9997	27-Jun-05	26.10	0.61
4009	31-Aug-03	25.90	0.36
8006	19-Aug-03	25.60	0.66
7020	08-Sep-06	25.50	0.22
9997	07-Jul-02	25.40	0.43
9997	17-Jul-00	25.30	0.23
4009	23-Nov-03	25.30	1.36
9997	10-Nov-02	25.30	0.41
9997	10-Sep-05	25.20	0.57
0019	15-Apr-04	25.10	0.26
9997	06-Apr-00	25.10	0.45
9997	02-Sep-06	25.00	0.28
0019	29-Mar-05	25.00	0.29
9997	03-Jun-05	24.60	0.43
0019	20-Aug-05	24.50	0.23
0019	03-Jun-05	24.40	0.45
9997	21-Jan-03	24.40	5.61
9997	04-Oct-01	24.40	0.47
9997	18-Nov-05	24.30	0.13
9997	11-Nov-03	24.30	0.71
9997	28-Nov-02	24.30	0.47
9997	09-Mar-06	24.20	0.68
7020	28-Jul-06	24.20	0.78
9997	11-Apr-06	24.10	0.73

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
7020	28-Apr-05	24.00	0.31
0019	10-May-05	23.90	0.28
9997	27-Nov-01	23.90	1.21
0019	19-Oct-05	23.80	1.60
9997	28-Apr-05	23.80	0.30
9997	10-Aug-00	23.80	0.20
0019	19-Aug-04	23.80	0.34
9997	23-Oct-02	23.70	0.92
9997	25-Jan-01	23.70	1.62
0019	28-Apr-05	23.60	0.31
8006	27-Apr-03	23.60	0.49
8006	31-Aug-03	23.40	0.39
0019	26-Jul-04	23.40	0.33
8006	23-Nov-03	23.00	1.37
9997	28-May-05	22.90	0.30
9997	18-Apr-00	22.80	0.23
9997	10-Jul-06	22.70	0.30
9997	21-Dec-01	22.70	1.85
9997	11-Jul-00	22.50	0.25
9997	13-Jan-01	22.50	4.45
9997	30-Mar-06	22.30	0.72
9997	17-Mar-05	22.10	1.35
0019	25-Aug-04	22.00	0.27
9997	26-May-02	21.80	0.27
9997	23-Mar-05	21.70	0.47
9997	27-Jul-05	21.60	0.28
9997	17-Nov-03	21.50	3.54
9997	03-Mar-02	21.00	1.18
9997	27-Aug-06	20.90	0.36
9997	22-Jan-05	20.80	4.05
7020	18-Mar-06	20.60	0.54
9997	18-Mar-06	20.50	0.43
0019	27-Feb-05	20.40	1.30
9997	08-Mar-01	20.40	5.24
9997	10-Jun-06	20.30	0.17
9997	06-Sep-03	20.20	0.31
9997	22-Mar-03	20.10	0.78
9997	12-Oct-03	20.10	0.34
9997	14-Mar-01	20.10	1.39
7020	08-Aug-05	20.10	1.18
9997	14-Sep-06	19.90	0.22
9997	29-Jun-00	19.70	0.54
0019	08-Aug-05	19.50	0.74
9997	29-Sep-02	19.50	0.31

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
9997	16-Nov-02	19.40	0.52
9997	28-Jan-05	19.40	3.15
0019	30-Oct-04	19.20	0.03
9997	23-Jun-00	19.10	0.35
9997	04-Mar-03	18.80	2.18
0019	14-Jul-04	18.80	0.96
4009	04-Mar-04	18.70	2.06
9997	13-May-01	18.70	0.39
9997	15-Aug-06	18.50	0.26
4009	01-Aug-03	18.30	1.28
9997	20-Aug-05	18.00	0.21
9997	09-Oct-00	17.90	0.10
9997	19-Oct-05	17.70	1.43
0019	14-Aug-05	17.60	0.27
0019	29-Nov-04	17.40	0.39
9997	19-Aug-03	17.30	0.62
9997	16-Sep-01	17.20	0.45
0019	10-Apr-05	17.00	0.15
9997	14-Aug-05	16.90	0.23
9997	25-May-01	16.90	0.48
9997	31-Aug-03	16.80	0.39
9997	02-Mar-01	16.70	1.95
9997	21-Oct-00	16.70	0.59
9997	29-Mar-05	16.60	0.30
9997	28-Aug-00	16.60	0.30
9997	15-Mar-02	16.40	0.57
4009	24-Sep-03	16.10	1.02
9997	24-Sep-03	16.00	0.84
8006	22-Jan-04	16.00	0.47
8006	24-Sep-03	15.90	0.87
9997	11-Sep-02	15.90	0.32
0019	03-Feb-05	15.80	0.22
9997	28-Jul-06	15.70	0.58
9997	23-Dec-03	15.50	0.32
9997	08-Aug-05	15.40	0.67
9997	10-Apr-05	15.30	0.19
9997	27-Oct-00	15.30	0.78
9997	23-Nov-03	15.20	0.55
9997	24-Jun-01	15.10	0.39
0019	05-Dec-04	14.80	3.83
7020	19-Oct-05	14.50	0.93
9997	05-Aug-01	14.40	0.23
8006	01-Aug-03	14.40	1.31
7020	10-Apr-05	14.10	0.19

Site ID	Date	PM10 ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
9997	30-Jul-01	14.00	1.15
9997	31-Jan-01	13.90	0.31
9997	15-Dec-01	13.70	3.68
8006	03-Apr-04	13.70	1.07
9997	06-Jul-01	13.00	0.32
9997	09-Dec-01	12.70	0.26
9997	07-Apr-01	12.40	0.87
0019	21-Feb-05	12.40	0.63
8006	04-Mar-04	12.00	2.06
9997	19-May-01	11.90	0.26
9997	11-Aug-01	11.80	0.26
0019	23-Nov-04	11.80	1.21
9997	14-Feb-03	11.80	2.14
0019	03-Apr-04	10.50	0.07
9997	24-Feb-01	10.50	0.75
9997	12-Mar-06	9.40	0.62
9997	28-Mar-03	9.20	0.25
9997	26-Feb-03	8.20	1.40
0019	04-Jan-05	8.10	0.82
0019	29-Dec-04	7.80	0.48
9997	16-Mar-03	7.50	0.90
7020	12-Mar-06	6.90	0.54
9997	03-Feb-05	5.60	0.14
0019	05-Mar-05	5.30	0.43
9997	05-Mar-05	4.50	0.38
9997	27-Feb-05	4.20	1.12
9997	04-Jan-05	3.60	0.74

**Table 4**  
**Compliance with 24-Hour PM<sub>2.5</sub> NAAQS**  
**in Maricopa and Pinal Counties 2000-2006<sup>2</sup>**

County <sup>3</sup>	Site	Year	98th Percentile	3-Year Avg	Mean	Cert	Method
013	0019	2000	32.9		<b>13.86</b>	N	120
013	0019	2001	30.4		10.85	Y	120
013	0019	2002	36.2	33.2	12.57	Y	120
013	0019	2003	25.9	30.8	10.68	Y	120
013	0019	2004	29.9	30.7	11.6	Y	145
013	0019	2005	40.5	32.1	12.91	Y	145
013	0019	2006	28.1	32.8	12.09		145
013	0019	2004	28.7		11.01	Y	145
013	0019	2005	42.3		11.87	Y	145
013	0019	2006	29.2	33.4	11.98		145
013	1003	2005	17.5		8.92	Y	145
013	1003	2006	20.0		9.1		145
013	4003	2005	36.4		12.84	Y	145
013	4003	2006	24.1		11.06		145
013	7020	2005	16.5		8.35		117
013	7020	2006	15.5		7.74		117
013	7020	2005	18.0	16.7	8.67		117
013	7020	2006	14.1	15.9	8.04		117
013	9990	2000	20.2		10.3	Y	120
013	9990	2001	22.7		9.37	Y	120
013	9990	2002	21.6	21.5	10.36	Y	120
013	9990	2003	25.0	23.1	9.63	Y	0
013	9990	2004	14.8	20.5	7.3	Y	145
013	9991	2000	26.8		12.07	Y	120
013	9992	2000	34.1		12.12	Y	120
013	9992	2001	35.3		10.92	Y	120
013	9992	2002	35.1	<b>34.8</b>	12.02	Y	120
013	9997	2000	32.1		11.49	Y	120
013	9997	2001	25		9.2	Y	120
013	9997	2002	31.9	29.7	11.63	Y	120
013	9997	2003	24.2	27.0	11.27	Y	0
013	9997	2004	27.6	27.9	9.73		145
013	9997	2005	28.2	26.7	9.72		145
013	9997	2006	21.9	25.9	8.95		145
021	0001	2000	18.9		8.48	Y	119
021	0001	2001	16.7		7.73	Y	119

<sup>2</sup> Result of AQS Application Quick Look Report (AMP450) for PM<sub>2.5</sub> for Maricopa and Pinal Counties. Column for 3-year average of 98<sup>th</sup> percentile values added in Excel. Maximum compliance values highlighted.

<sup>3</sup> County 013 is Maricopa; county 021 is Pinal.

County <sup>3</sup>	Site	Year	98th Percentile	3-Year Avg	Mean	Cert	Method
021	0001	2002	20.8	18.8	8.46		119
021	0001	2003	26.7	21.4	8.42	N	119
021	0001	2004	13.7	20.4	7.13	N	119
021	0001	2005	16.9	19.1	7.33	N	0
021	0001	2006	15.2	15.3	6.57		117
021	3002	2000	18		7.28	Y	119
021	3002	2001	13.1		6.26	Y	119
021	3002	2002	13.1	14.7	6.39		119
021	3002	2003	21.1	15.8	6.3	N	119
021	3002	2004	10.3	14.8	5.51	N	0
021	3002	2005	10.6	14.0	5.52	N	0
021	3002	2006	10.2	10.4	5.42		118
021	7001	2002	11		7.73		117



**Table 5**  
**Correlation Between 24-Hour PM<sub>2.5</sub> and Nitrate at the Same Monitor**  
**for Maricopa County 2000-2006**

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
04-Jan-05	9997	0.60	0.74
22-Apr-01	9997	5.60	2.83
18-Oct-04	0019	1.70	0.83
04-Dec-02	9997	30.60	13.79
08-Mar-05	9997	8.80	3.96
22-Jan-05	0019	11.20	5.01
08-Mar-01	9997	11.80	5.24
07-Jan-05	9997	8.80	3.65
15-Mar-06	9997	12.20	5.05
10-Jan-05	0019	11.40	4.58
21-Jan-03	9997	13.70	5.49
30-Oct-04	9997	9.40	3.75
19-Mar-03	9997	2.70	1.07
24-Oct-04	9997	5.60	2.17
24-Feb-05	9997	3.70	1.40
01-Mar-03	9997	6.90	2.57
09-Jan-03	9997	16.70	6.23
24-Oct-00	9997	6.80	2.53
12-Dec-01	9997	15.20	5.61
31-Jan-04	9997	9.90	3.62
20-Feb-03	9997	12.10	4.32
24-Feb-04	9997	11.70	4.18
18-Feb-05	9997	9.40	3.32
17-Feb-03	9997	14.80	5.18
05-Nov-00	9997	12.20	4.05
11-Nov-00	9997	4.70	1.55
23-Nov-04	9997	8.40	2.74
17-Nov-04	9997	10.70	3.48
24-Oct-04	0019	9.10	2.90
23-Nov-00	9997	19.20	5.99
11-Mar-01	9997	8.60	2.68
22-Jan-05	9997	13.10	4.05
11-Dec-03	9997	13.70	4.20
26-Feb-03	9997	4.60	1.40
18-Feb-01	9997	18.30	5.57
12-Jan-03	9997	20.70	6.25
23-Feb-03	9997	10.00	2.93
04-Jan-05	0019	2.80	0.82
14-Feb-03	9997	7.00	2.02
28-Jan-05	9997	10.90	3.15
15-Jan-03	9997	27.30	7.81

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
05-Dec-04	0019	13.40	3.83
25-Nov-02	9997	15.50	4.41
29-Jan-06	7020	11.25	3.14
27-Feb-04	9997	7.00	1.93
02-Mar-05	9997	10.20	2.79
02-Mar-01	9997	7.20	1.95
04-Mar-03	9997	7.80	2.11
08-Sep-02	9997	7.40	2.00
25-Jan-04	9997	6.50	1.75
04-Mar-04	9997	6.00	1.61
15-Feb-05	9997	19.70	5.29
19-Jan-04	9997	10.20	2.73
08-Dec-00	9997	17.20	4.61
16-Mar-03	9997	3.30	0.88
07-Mar-04	9997	11.10	2.95
08-Dec-04	9997	24.50	6.50
05-Dec-04	9997	13.70	3.63
21-Feb-01	9997	10.20	2.70
28-Jan-05	0019	13.00	3.44
07-Mar-03	9997	10.70	2.81
30-Sep-04	9997	2.00	0.52
15-Feb-05	0019	24.05	6.23
13-Jan-05	9997	11.70	2.99
05-Feb-03	9997	10.60	2.68
08-Feb-03	9997	14.50	3.66
12-Feb-05	9997	3.50	0.86
26-Nov-03	9997	18.30	4.50
13-Dec-02	9997	26.90	6.59
10-Feb-06	9997	9.90	2.42
02-Nov-00	9997	13.70	3.31
17-Nov-04	0019	16.50	3.98
07-Jan-01	9997	28.50	6.87
28-Jan-04	9997	10.50	2.53
29-Jan-06	9997	16.70	4.00
10-Feb-06	7020	11.25	2.69
28-Mar-00	9997	6.80	1.62
30-Dec-05	9997	21.60	5.12
28-Jan-01	9997	11.20	2.65
30-Dec-01	9997	25.90	6.11
01-Feb-06	9997	11.90	2.78
26-Nov-04	9997	38.00	8.74
06-Feb-05	9997	7.90	1.81
24-Feb-01	9997	3.30	0.75
10-Jan-05	9997	15.60	3.54

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
30-Jan-03	9997	15.80	3.57
21-Dec-05	9997	30.30	6.81
17-Jan-02	9997	13.90	3.12
19-Oct-05	7020	4.20	0.93
03-Feb-04	9997	6.90	1.52
19-Oct-05	9997	6.50	1.43
25-Jan-05	9997	4.70	1.02
21-Feb-04	9997	9.50	2.04
15-Feb-01	9997	11.60	2.46
12-Oct-00	9997	6.90	1.46
21-Mar-06	9997	4.70	0.98
25-Jan-01	9997	7.90	1.62
16-Jan-04	9997	10.00	2.05
27-Mar-02	9997	10.10	2.06
15-Feb-04	9997	14.10	2.85
14-Dec-03	9997	31.50	6.32
14-Mar-01	9997	7.00	1.39
07-Jan-04	9997	26.00	5.16
06-Feb-04	9997	12.60	2.50
01-Dec-02	9997	15.10	2.95
30-Nov-05	9997	21.20	4.13
11-Dec-00	9997	32.10	6.24
29-Dec-04	0019	2.50	0.48
22-Feb-06	9997	9.80	1.88
30-Jul-01	9997	6.00	1.15
14-Nov-03	9997	10.50	2.01
03-Apr-04	9997	4.50	0.86
30-Dec-05	0019	28.20	5.35
29-Dec-00	9997	24.50	4.64
27-Dec-01	9997	28.20	5.34
29-Oct-02	9997	9.00	1.69
02-Dec-04	9997	28.10	5.27
24-Dec-05	9997	26.40	4.92
27-Feb-05	0019	7.00	1.30
02-Dec-03	9997	24.20	4.48
10-Mar-00	9997	11.20	2.06
30-Oct-00	9997	6.20	1.12
01-Mar-04	9997	8.50	1.52
27-Dec-05	9997	10.00	1.79
19-Feb-02	9997	8.20	1.46
01-Jan-05	9997	28.20	4.99
19-Oct-05	0019	9.10	1.60
29-Nov-00	9997	17.20	3.02
20-Mar-05	9997	5.00	0.87

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
24-Dec-05	7020	11.75	2.05
29-Dec-04	9997	3.50	0.60
18-Dec-05	9997	24.40	4.20
19-Jan-01	9997	19.10	3.27
12-Mar-06	7020	3.20	0.54
02-Nov-04	9997	3.40	0.57
12-Mar-06	9997	3.70	0.62
01-Nov-02	9997	14.00	2.32
05-Nov-03	9997	11.80	1.96
11-Feb-03	9997	13.40	2.22
02-Nov-03	9997	9.60	1.58
27-Feb-01	9997	5.20	0.85
07-Apr-01	9997	5.30	0.87
24-Jan-03	9997	12.80	2.09
14-Jan-02	9997	18.10	2.94
06-Jan-03	9997	19.90	3.21
11-Nov-04	0019	17.00	2.74
17-Dec-00	9997	30.50	4.91
03-Dec-05	9997	12.00	1.93
17-Mar-05	9997	8.40	1.35
22-Dec-02	9997	31.90	5.11
26-Nov-00	9997	26.10	4.17
30-Dec-05	7020	11.05	1.76
02-Jan-02	9997	8.60	1.36
08-Jan-02	9997	16.90	2.67
27-Nov-01	9997	7.30	1.15
01-Feb-02	9997	8.00	1.26
17-Jan-06	9997	12.60	1.97
20-Dec-00	9997	22.20	3.44
07-Dec-02	9997	19.50	3.02
07-Feb-02	9997	14.30	2.20
06-Feb-01	9997	10.10	1.55
27-Feb-05	9997	7.30	1.12
08-Jan-06	9997	23.10	3.52
09-Mar-02	9997	7.50	1.14
12-Dec-05	0019	49.55	7.51
06-Mar-06	7020	9.00	1.36
31-Dec-02	9997	23.70	3.52
08-Aug-05	7020	8.00	1.18
09-Feb-04	9997	14.90	2.19
26-Jan-06	9997	13.40	1.97
12-Feb-01	9997	12.10	1.76
09-Mar-06	9997	4.70	0.68
10-Apr-01	9997	5.10	0.74

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
16-Jan-05	9997	22.60	3.26
08-Nov-00	9997	12.00	1.73
20-Jan-02	9997	29.80	4.27
15-Dec-05	9997	9.40	1.33
04-Mar-00	9997	6.90	0.98
18-Dec-05	0019	33.65	4.69
14-Jan-06	9997	21.90	3.05
03-Jul-05	7020	3.45	0.48
23-Jan-02	9997	7.10	0.99
27-Oct-00	9997	5.60	0.78
06-Apr-04	9997	6.20	0.86
16-Jan-05	0019	23.85	3.30
25-Feb-02	9997	8.90	1.22
04-Nov-02	9997	10.20	1.39
24-Nov-05	0019	14.30	1.95
17-Mar-05	0019	13.00	1.77
30-Mar-02	9997	8.60	1.17
13-Feb-02	9997	13.20	1.79
22-Feb-06	7020	9.10	1.22
16-Feb-06	7020	14.60	1.95
28-Jul-06	7020	5.85	0.78
10-Mar-03	9997	8.60	1.15
25-Mar-03	9997	8.60	1.14
02-Feb-03	9997	7.10	0.94
30-Mar-06	9997	5.50	0.72
06-Dec-05	7020	16.85	2.20
14-Jul-04	0019	7.35	0.96
24-Apr-03	9997	8.10	1.05
14-Dec-00	9997	22.20	2.88
14-Jul-04	9997	5.90	0.76
19-Feb-06	9997	7.70	0.99
19-Dec-02	9997	12.40	1.59
20-Jan-06	9997	12.00	1.54
13-Oct-05	0019	15.40	1.96
03-Mar-02	9997	6.70	0.85
11-Dec-04	9997	17.80	2.24
15-Mar-02	9997	4.00	0.50
06-Apr-03	9997	4.70	0.58
03-Mar-06	9997	7.10	0.88
04-Feb-02	9997	8.30	1.02
08-Nov-03	9997	15.30	1.87
16-Dec-02	9997	15.00	1.82
18-Mar-06	7020	4.45	0.54
18-Apr-03	9997	5.90	0.71

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
24-Dec-05	0019	46.35	5.53
12-Nov-05	0019	12.10	1.43
30-Mar-06	7020	5.95	0.70
30-Nov-05	7020	13.45	1.58
24-Nov-05	9997	15.20	1.78
25-Dec-02	9997	45.90	5.35
18-Mar-02	9997	8.50	0.99
09-Apr-04	9997	7.40	0.86
10-Aug-03	9997	2.10	0.24
14-Mar-05	9997	4.70	0.54
13-Mar-04	9997	4.70	0.54
05-Mar-05	0019	3.75	0.43
22-Jan-04	9997	3.70	0.42
23-Dec-04	9997	8.30	0.93
28-Feb-06	9997	7.80	0.87
09-Apr-04	0019	8.50	0.95
26-Dec-04	9997	27.60	3.08
04-Apr-01	9997	5.90	0.66
21-Feb-05	0019	5.65	0.63
29-Aug-01	9997	6.10	0.68
06-Dec-05	9997	20.80	2.30
02-Jul-00	9997	5.80	0.64
10-Dec-02	9997	13.90	1.52
11-Dec-04	0019	24.90	2.72
05-Oct-02	9997	11.70	1.28
06-May-03	9997	7.70	0.84
18-Dec-05	7020	16.50	1.80
27-Feb-00	9997	13.40	1.46
31-Oct-01	9997	10.40	1.11
13-Sep-05	9997	7.20	0.77
23-Oct-02	9997	8.40	0.90
12-Dec-05	7020	17.05	1.81
11-Apr-06	9997	6.90	0.73
05-Mar-05	9997	3.60	0.38
04-Feb-06	9997	15.00	1.58
21-Feb-05	9997	5.80	0.61
19-Jan-05	9997	6.90	0.72
25-May-05	9997	12.20	1.26
30-Nov-01	9997	13.50	1.37
05-Jan-02	9997	17.00	1.71
18-Mar-06	9997	4.30	0.43
15-Apr-03	9997	2.70	0.27
25-Feb-06	9997	11.70	1.14
17-Jan-06	7020	10.95	1.06

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
06-Jun-05	9997	7.40	0.71
04-Jul-06	7020	8.70	0.84
21-Apr-03	9997	6.60	0.64
23-Mar-05	9997	4.90	0.47
15-Oct-00	9997	10.30	0.99
06-Dec-05	0019	25.10	2.41
09-Feb-05	9997	10.10	0.97
08-Aug-05	9997	7.00	0.67
29-Mar-01	9997	7.70	0.74
23-Dec-04	0019	11.30	1.08
31-Jul-02	9997	9.30	0.89
28-Sep-05	9997	6.50	0.62
22-Mar-03	9997	8.10	0.77
04-Jan-04	9997	16.10	1.53
18-Oct-04	9997	9.80	0.93
29-Aug-05	9997	6.50	0.62
23-Nov-04	0019	12.80	1.21
16-Oct-05	9997	8.20	0.77
23-Jan-06	9997	9.70	0.91
12-Feb-04	9997	4.30	0.41
11-Nov-03	9997	7.60	0.71
06-Mar-02	9997	10.30	0.96
05-Dec-03	9997	19.60	1.83
12-Nov-05	7020	7.70	0.72
13-Apr-05	9997	10.20	0.95
09-May-03	9997	9.70	0.90
04-Jul-06	9997	8.10	0.75
16-Sep-01	9997	4.30	0.40
20-Nov-00	9997	22.30	2.07
21-Oct-00	9997	6.40	0.59
15-Nov-05	9997	6.40	0.59
28-Feb-06	7020	6.85	0.62
26-Oct-02	9997	11.10	1.01
12-Aug-06	9997	5.70	0.52
29-Dec-03	9997	22.40	2.03
28-Feb-02	9997	10.10	0.91
08-Apr-06	9997	10.10	0.91
05-Mar-01	9997	9.20	0.83
12-Apr-03	9997	7.20	0.64
04-Oct-01	9997	5.00	0.44
26-Dec-03	9997	4.00	0.35
01-Sep-01	9997	5.20	0.46
23-Jul-04	9997	8.30	0.74
19-Nov-02	9997	17.30	1.52

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
11-Jan-06	9997	15.60	1.37
17-Dec-03	9997	12.70	1.11
18-Nov-01	9997	18.20	1.59
11-Aug-05	9997	7.70	0.65
22-May-01	9997	7.70	0.65
10-Sep-05	9997	6.80	0.57
26-Mar-01	9997	9.70	0.81
24-Mar-02	9997	5.90	0.49
23-May-02	9997	8.80	0.74
17-Oct-02	9997	7.30	0.61
01-Apr-01	9997	9.00	0.75
16-Feb-02	9997	11.80	0.98
23-Sep-06	9997	10.00	0.83
14-Apr-02	9997	6.50	0.53
28-Jul-06	9997	7.10	0.58
05-Dec-00	9997	18.00	1.47
12-Sep-04	9997	9.00	0.73
03-Apr-00	9997	10.10	0.82
27-May-04	9997	8.70	0.71
05-May-06	7020	8.25	0.67
12-Jun-05	9997	5.70	0.46
23-Mar-05	0019	5.85	0.48
09-Feb-05	0019	12.45	1.01
27-Jun-05	9997	7.50	0.61
28-May-01	9997	4.60	0.37
17-Dec-04	9997	8.80	0.71
25-Jul-02	9997	5.30	0.43
28-Aug-03	9997	6.50	0.52
23-Dec-00	9997	25.30	2.04
11-Apr-06	7020	5.65	0.45
24-Nov-05	7020	11.90	0.96
17-Mar-01	9997	5.40	0.43
27-Mar-06	9997	6.30	0.51
09-Jul-01	9997	6.40	0.51
26-Jul-04	9997	6.30	0.50
22-Oct-05	9997	10.30	0.82
18-Feb-04	9997	13.50	1.06
11-May-02	9997	12.80	1.01
20-Apr-02	9997	6.50	0.51
21-Apr-04	0019	10.95	0.85
09-Dec-05	9997	19.50	1.51
13-Feb-06	9997	17.60	1.36
07-Nov-02	9997	10.70	0.82
12-Jun-01	9997	6.10	0.47



Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
03-Aug-02	9997	8.20	0.63
22-Apr-05	0019	14.40	1.10
25-Jul-06	9997	10.90	0.83
16-Aug-03	9997	11.70	0.88
01-Jan-04	9997	24.60	1.85
22-Apr-05	7020	11.60	0.87
22-Apr-05	9997	10.80	0.81
28-Dec-02	9997	24.70	1.85
05-May-06	9997	8.90	0.67
07-Sep-01	9997	6.00	0.45
25-Apr-05	9997	5.20	0.39
29-Nov-04	0019	5.30	0.39
17-Jun-00	9997	7.40	0.54
30-Apr-03	9997	8.00	0.58
08-May-06	9997	9.00	0.65
29-Apr-06	9997	9.50	0.68
29-Jul-04	9997	7.60	0.54
08-Aug-05	0019	10.45	0.74
12-May-04	9997	7.50	0.53
27-Jun-01	9997	7.10	0.50
18-May-04	9997	5.30	0.37
11-Jul-03	9997	12.40	0.86
29-Apr-06	7020	7.65	0.53
02-Dec-00	9997	17.60	1.21
08-May-02	9997	10.60	0.72
13-Jan-04	9997	10.00	0.68
18-Apr-04	9997	6.70	0.45
04-May-01	9997	4.60	0.31
31-Jul-06	9997	4.80	0.32
28-Mar-03	9997	3.00	0.20
03-Jun-05	9997	6.50	0.43
11-Jan-06	7020	11.25	0.75
21-Apr-04	9997	10.50	0.70
03-Jun-05	7020	7.45	0.49
15-Apr-00	9997	7.90	0.52
17-Apr-06	7020	6.10	0.40
10-Oct-01	9997	7.80	0.52
28-Apr-05	7020	4.75	0.31
24-Jul-01	9997	5.60	0.37
10-Apr-05	7020	2.90	0.19
03-Jun-05	0019	6.90	0.45
08-Jun-00	9997	9.60	0.62
19-May-05	9997	10.40	0.67
27-Jan-03	9997	12.20	0.79

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
19-Aug-04	9997	5.00	0.32
09-May-04	9997	8.30	0.53
11-Jun-04	9997	10.20	0.65
11-May-06	7020	8.80	0.56
25-May-01	9997	7.60	0.48
29-Apr-02	9997	12.40	0.79
01-May-05	9997	6.80	0.43
18-Jan-03	9997	14.80	0.93
08-Jun-04	9997	6.70	0.42
15-Jun-05	7020	9.15	0.57
06-Jul-01	9997	4.00	0.25
09-Jun-05	9997	6.90	0.43
21-May-04	0019	6.15	0.38
31-Jan-01	9997	5.00	0.31
02-Jun-03	9997	7.50	0.46
17-Sep-06	9997	8.30	0.51
15-Nov-01	9997	9.50	0.59
16-Apr-01	9997	13.30	0.81
18-Jul-01	9997	7.60	0.46
18-Aug-06	9997	7.10	0.43
21-May-04	9997	6.30	0.38
01-Sep-05	9997	9.70	0.59
29-Jun-00	9997	6.20	0.37
07-May-05	9997	5.90	0.36
13-Jul-06	9997	6.70	0.40
22-Jun-06	9997	7.20	0.43
20-Jun-04	9997	4.90	0.29
24-May-03	9997	9.60	0.57
18-Jun-01	9997	7.60	0.45
26-Aug-01	9997	7.30	0.44
29-Mar-05	9997	5.00	0.30
02-Apr-06	9997	7.60	0.45
28-Apr-05	0019	5.30	0.31
28-Aug-00	9997	5.00	0.30
29-Mar-05	0019	4.95	0.29
22-Jun-06	7020	8.10	0.48
21-Aug-06	7020	7.00	0.41
15-Jul-01	9997	4.90	0.29
21-Oct-04	9997	7.00	0.41
27-Jul-05	9997	4.70	0.28
27-Jul-01	9997	6.10	0.36
21-Sep-00	9997	7.40	0.43
09-Jun-05	0019	7.60	0.44
29-Jun-03	9997	10.50	0.61

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
10-Nov-02	9997	5.10	0.30
28-Apr-05	9997	5.10	0.30
23-Apr-06	7020	7.60	0.44
11-Jun-03	9997	6.00	0.35
21-Jun-01	9997	6.10	0.35
16-Jun-02	9997	10.50	0.61
27-Aug-06	7020	5.80	0.33
20-Sep-02	9997	8.80	0.50
16-Mar-04	9997	10.90	0.62
06-Aug-06	9997	5.90	0.34
21-Feb-00	9997	4.20	0.24
17-Jul-04	9997	6.00	0.34
11-Mar-05	9997	11.00	0.62
27-May-04	0019	12.25	0.69
29-Nov-04	9997	7.60	0.43
03-Jul-05	9997	10.20	0.58
13-Mar-03	9997	10.70	0.60
05-Jan-06	7020	9.65	0.54
06-Nov-05	9997	13.60	0.77
25-Mar-04	9997	8.80	0.50
19-Mar-04	9997	10.00	0.56
20-Oct-02	9997	15.00	0.84
10-Jul-06	7020	7.35	0.41
08-Apr-02	9997	13.30	0.74
08-Jul-00	9997	4.70	0.26
26-Apr-06	9997	10.20	0.57
03-Sep-04	9997	7.20	0.40
27-May-00	9997	8.40	0.47
06-Jun-01	9997	8.50	0.47
17-Aug-05	9997	6.70	0.37
11-Jan-02	9997	7.40	0.41
07-Oct-01	9997	5.00	0.27
11-Mar-05	0019	14.65	0.80
12-Mar-02	9997	7.80	0.43
23-Apr-06	9997	9.10	0.49
19-May-01	9997	3.60	0.19
26-Aug-05	9997	7.00	0.38
12-Sep-04	0019	14.50	0.78
30-May-03	9997	9.00	0.48
26-Jul-04	0019	6.05	0.33
24-Jul-05	9997	6.00	0.32
24-Jun-01	9997	6.60	0.35
21-Jul-01	9997	7.30	0.39
04-Apr-05	7020	6.60	0.35

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
03-Aug-06	9997	6.90	0.37
16-May-01	9997	6.50	0.34
15-Jun-05	9997	7.80	0.41
12-Aug-02	9997	8.00	0.42
21-Nov-01	9997	18.40	0.97
27-May-03	9997	11.20	0.59
19-Jun-02	9997	11.00	0.58
26-Mar-05	9997	4.00	0.21
30-Sep-04	0019	9.20	0.48
28-Oct-05	9997	9.30	0.49
04-Sep-01	9997	4.80	0.25
23-Dec-03	9997	4.00	0.21
27-Sep-03	9997	8.60	0.45
20-Nov-03	9997	11.80	0.61
10-May-05	9997	5.20	0.27
20-Jun-00	9997	5.70	0.29
07-May-01	9997	10.00	0.52
26-Jun-03	9997	9.00	0.46
15-Jun-05	0019	8.30	0.43
23-Jun-00	9997	5.60	0.29
30-Jun-01	9997	8.30	0.43
17-Jun-04	9997	7.40	0.38
12-Nov-01	9997	13.50	0.69
04-Feb-06	7020	12.50	0.64
12-Apr-04	9997	7.50	0.38
30-Oct-03	9997	23.30	1.19
24-May-04	9997	6.20	0.32
24-Nov-01	9997	8.80	0.45
27-Sep-00	9997	7.70	0.39
30-Aug-06	9997	9.20	0.47
31-Mar-03	9997	7.70	0.39
15-Oct-03	9997	8.00	0.40
01-Sep-05	0019	11.15	0.56
12-May-03	9997	11.30	0.57
28-Oct-01	9997	10.40	0.52
08-Jun-04	0019	8.45	0.42
10-Jul-06	9997	6.00	0.30
14-Aug-05	9997	4.70	0.23
13-May-05	9997	7.20	0.36
22-Jan-01	9997	9.20	0.46
25-Aug-00	9997	7.10	0.35
10-May-05	0019	5.75	0.28
20-Dec-03	9997	17.40	0.86
02-Aug-05	9997	6.70	0.33

Date	Site ID	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	Nitrate (µg/m <sup>3</sup> )
23-Apr-02	9997	9.90	0.49
21-Nov-05	9997	14.30	0.70
11-Sep-06	9997	7.20	0.35
31-May-01	9997	6.60	0.32
22-Oct-01	9997	10.40	0.51
16-Nov-02	9997	7.00	0.34
13-Aug-04	9997	7.70	0.37
03-Jun-01	9997	7.90	0.38
16-Aug-04	9997	7.40	0.36
05-Sep-02	9997	12.90	0.62
08-Jun-01	9997	9.80	0.47
09-Jul-05	9997	8.50	0.41
03-Aug-06	7020	7.35	0.36
01-May-01	9997	9.00	0.43
16-Apr-05	0019	17.40	0.84
04-Apr-05	9997	6.80	0.33
16-May-05	7020	6.40	0.31
12-Oct-04	0019	10.50	0.50
20-Jul-04	9997	8.70	0.41
15-Jun-01	9997	7.40	0.35
04-Apr-05	0019	7.90	0.38
15-Aug-02	9997	9.70	0.46
27-Aug-06	9997	7.70	0.36
20-Aug-05	9997	4.40	0.21
30-Jul-05	9997	5.00	0.24
30-May-04	9997	7.70	0.36
21-Aug-02	9997	7.50	0.35
11-Jun-00	9997	6.60	0.31
19-Sep-01	9997	7.60	0.36
15-May-03	9997	19.60	0.92
04-Oct-05	9997	8.80	0.41
25-Oct-01	9997	12.70	0.59
31-Aug-04	9997	8.50	0.40
18-May-03	9997	10.20	0.47
31-May-05	9997	9.50	0.44
20-Jun-03	9997	7.40	0.34
13-Sep-05	7020	6.65	0.31
28-May-05	9997	6.50	0.30
17-Aug-01	9997	8.80	0.41
04-May-05	9997	8.50	0.39
06-Nov-01	9997	11.20	0.52
21-Sep-04	9997	6.40	0.29
15-Jul-05	0019	9.30	0.43
30-Apr-04	9997	2.90	0.13

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
20-Jul-00	9997	7.80	0.36
15-Jul-05	9997	9.40	0.43
27-Apr-03	9997	8.40	0.38
06-Nov-05	7020	10.55	0.48
26-Jul-03	9997	13.00	0.59
05-Aug-01	9997	4.80	0.22
09-May-04	0019	9.70	0.44
15-Aug-06	9997	5.80	0.26
02-May-06	9997	5.30	0.24
14-Dec-04	9997	7.80	0.35
27-Oct-04	9997	9.00	0.40
15-May-04	9997	9.50	0.43
26-Aug-05	7020	6.40	0.29
03-Nov-01	9997	11.20	0.50
23-Jun-04	9997	8.60	0.38
19-Oct-01	9997	12.60	0.56
04-Jun-02	9997	11.80	0.53
21-Aug-06	9997	7.60	0.34
30-Aug-02	9997	9.50	0.42
06-Sep-03	9997	6.80	0.30
10-Jul-02	9997	9.40	0.42
08-Jun-03	9997	7.40	0.33
06-Nov-05	0019	17.90	0.79
03-Oct-00	9997	10.70	0.47
20-Aug-01	9997	5.80	0.26
17-Jul-03	9997	16.30	0.72
09-Jul-05	0019	9.20	0.41
29-May-06	7020	8.50	0.37
10-Feb-02	9997	5.20	0.23
11-Sep-02	9997	6.90	0.30
22-Nov-02	9997	16.30	0.71
28-Mar-04	9997	6.50	0.28
09-Jul-05	7020	8.10	0.35
16-Mar-00	9997	10.70	0.46
09-Oct-03	9997	7.90	0.34
18-Aug-02	9997	10.20	0.44
26-Jan-02	9997	17.70	0.76
09-Dec-01	9997	5.50	0.24
02-Aug-05	7020	8.00	0.34
17-May-02	9997	9.90	0.43
23-Jul-03	9997	9.20	0.39
07-Aug-04	9997	5.90	0.25
20-Jul-04	0019	10.70	0.46
17-Apr-06	9997	8.40	0.36

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
14-Aug-01	9997	5.80	0.25
28-May-05	0019	8.30	0.35
14-Aug-05	7020	4.90	0.21
10-May-05	7020	5.10	0.22
06-May-04	9997	8.60	0.36
06-Sep-04	9997	7.60	0.32
23-Jul-00	9997	8.40	0.35
16-May-05	0019	10.15	0.43
13-Oct-01	9997	6.30	0.27
10-Sep-01	9997	11.60	0.49
16-Jul-02	9997	10.50	0.44
26-Jun-00	9997	4.90	0.21
05-Jul-04	9997	10.50	0.44
07-Aug-00	9997	7.90	0.33
02-Jun-04	0019	10.65	0.45
05-Jun-03	9997	5.90	0.25
20-May-06	9997	8.30	0.35
02-Aug-01	9997	6.40	0.27
13-Sep-01	9997	5.20	0.22
23-Mar-01	9997	8.90	0.37
25-Aug-03	9997	8.00	0.33
21-May-03	9997	13.50	0.56
11-Aug-01	9997	4.80	0.20
26-Jun-04	0019	8.70	0.36
02-Sep-06	9997	6.80	0.28
23-May-06	7020	7.65	0.32
07-Jul-02	9997	9.70	0.40
10-Apr-05	0019	3.60	0.15
16-Sep-05	9997	7.80	0.32
06-Aug-02	9997	7.10	0.29
22-Sep-01	9997	8.30	0.34
25-Jun-02	9997	8.80	0.36
27-Jul-05	7020	6.45	0.26
25-Aug-04	9997	5.50	0.23
02-Jul-03	9997	14.20	0.58
14-May-06	9997	9.00	0.37
08-Sep-06	7020	5.30	0.22
05-Jun-04	9997	8.60	0.35
16-Apr-05	9997	18.10	0.74
23-Jan-06	7020	4.90	0.20
15-May-04	0019	12.00	0.49
03-Jan-03	9997	15.30	0.62
17-Jul-00	9997	4.80	0.19
28-Apr-01	9997	5.70	0.23

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
24-Sep-04	0019	18.85	0.76
23-Aug-01	9997	9.90	0.40
22-May-05	9997	10.60	0.42
19-Aug-04	0019	8.45	0.34
16-Apr-05	7020	14.20	0.57
28-Nov-02	9997	11.00	0.44
16-Jul-06	7020	11.80	0.47
04-Jun-06	7020	9.55	0.38
20-Sep-06	7020	7.65	0.30
27-Apr-00	9997	10.40	0.41
06-Sep-04	0019	9.60	0.38
23-May-06	9997	7.10	0.28
11-Jul-04	9997	6.00	0.24
22-Sep-05	9997	8.50	0.34
06-Oct-03	9997	8.10	0.32
20-Jul-03	9997	14.20	0.56
14-Aug-05	0019	6.75	0.27
08-Jul-04	9997	7.00	0.27
25-Sep-05	9997	7.20	0.28
04-Jul-02	9997	10.70	0.42
22-Jun-02	9997	6.30	0.25
29-Jul-03	9997	8.30	0.32
24-Jun-05	9997	11.80	0.46
31-Aug-00	9997	6.10	0.24
01-Sep-05	7020	9.45	0.37
01-Jul-02	9997	8.60	0.33
31-Oct-05	0019	13.10	0.51
24-Mar-06	7020	6.55	0.25
19-Sep-05	7020	7.15	0.28
24-Sep-00	9997	5.90	0.23
29-Jan-02	9997	7.20	0.28
25-Sep-05	7020	5.70	0.22
23-Jun-03	9997	6.00	0.23
07-Apr-05	9997	9.50	0.36
05-Apr-06	7020	4.65	0.18
31-Mar-04	9997	9.80	0.37
04-May-05	7020	9.05	0.34
16-May-05	9997	8.90	0.34
20-Sep-06	9997	6.40	0.24
13-Sep-05	0019	9.55	0.36
23-Aug-05	9997	5.20	0.20
14-May-02	9997	13.00	0.49
27-Apr-04	9997	7.80	0.29
31-Oct-05	9997	10.70	0.40



Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
02-Jun-00	9997	10.60	0.40
29-Jul-00	9997	10.30	0.38
24-Aug-06	9997	5.10	0.19
09-Apr-03	9997	7.00	0.26
13-Oct-05	9997	11.30	0.42
17-Jun-03	9997	8.50	0.32
24-Aug-02	9997	9.30	0.34
01-Aug-04	0019	9.90	0.37
25-Aug-04	0019	7.25	0.27
12-Jul-05	9997	8.20	0.30
20-Dec-04	9997	25.50	0.94
14-Jun-04	0019	8.35	0.31
10-Jun-06	7020	6.10	0.22
29-May-06	9997	8.20	0.30
14-Jun-03	9997	8.00	0.29
29-Jun-04	9997	6.10	0.22
07-Oct-05	7020	9.00	0.33
03-Jul-01	9997	5.90	0.22
13-Nov-02	9997	9.00	0.33
10-Oct-05	9997	5.80	0.21
13-Jul-02	9997	10.60	0.39
07-Aug-03	9997	12.50	0.45
09-Aug-02	9997	8.30	0.30
20-Apr-06	9997	8.70	0.32
10-Mar-04	9997	10.60	0.38
18-Sep-04	9997	9.70	0.35
12-Oct-03	9997	9.20	0.33
18-Oct-03	9997	9.30	0.33
10-Jan-04	9997	7.70	0.28
28-Sep-01	9997	9.30	0.33
18-May-00	9997	8.70	0.31
26-Jun-04	9997	7.30	0.26
18-Oct-00	9997	8.30	0.30
05-Apr-06	9997	4.70	0.17
28-Aug-04	9997	8.20	0.29
22-Mar-04	9997	6.60	0.23
22-May-05	0019	11.35	0.40
24-Sep-04	9997	13.00	0.46
01-Apr-05	9997	4.70	0.17
30-Apr-00	9997	7.60	0.27
09-Nov-05	9997	13.20	0.46
25-Apr-01	9997	7.90	0.28
25-Oct-05	7020	5.85	0.21
10-Apr-05	9997	5.40	0.19

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
08-Aug-01	9997	7.80	0.27
24-Apr-04	9997	7.40	0.26
16-Jun-06	7020	8.30	0.29
01-Oct-05	9997	10.60	0.37
21-Mar-02	9997	8.90	0.31
16-Jun-06	9997	6.90	0.24
17-Sep-02	9997	13.00	0.45
21-Jul-05	7020	14.90	0.51
21-Sep-03	9997	10.10	0.35
17-May-06	9997	7.40	0.25
25-Sep-01	9997	6.70	0.23
28-May-05	7020	6.60	0.23
11-Oct-02	9997	9.80	0.33
30-Sep-00	9997	8.70	0.30
15-Jul-05	7020	11.00	0.37
28-Jun-02	9997	10.40	0.35
22-Aug-04	9997	4.40	0.15
04-Sep-05	9997	7.50	0.25
31-Aug-04	0019	10.75	0.36
30-Sep-03	9997	11.50	0.38
07-Aug-04	0019	7.00	0.23
10-Aug-04	9997	6.20	0.21
03-Nov-05	9997	12.70	0.42
14-Jun-04	9997	8.40	0.28
24-Oct-03	9997	14.40	0.48
21-Jul-05	9997	12.50	0.41
12-Sep-03	9997	8.40	0.28
19-Sep-05	9997	9.40	0.31
16-Oct-01	9997	15.20	0.50
22-Feb-02	9997	7.20	0.23
12-May-00	9997	10.50	0.34
07-Oct-05	9997	7.80	0.25
06-Oct-04	9997	10.70	0.34
14-Sep-02	9997	5.70	0.18
27-Oct-03	9997	12.40	0.39
05-Aug-05	9997	7.50	0.24
04-Jun-06	9997	10.30	0.33
29-May-02	9997	11.80	0.37
21-May-00	9997	9.70	0.30
20-Jun-04	0019	5.90	0.18
08-Jul-03	9997	16.40	0.51
14-Sep-06	7020	5.25	0.16
09-Apr-00	9997	12.80	0.39
03-May-04	9997	8.40	0.26

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
15-Sep-04	9997	10.70	0.33
27-Jun-05	7020	9.65	0.30
22-May-05	7020	8.50	0.26
09-Aug-06	9997	7.20	0.22
15-Apr-04	0019	8.35	0.26
01-Jul-06	9997	10.10	0.31
30-Jun-05	9997	13.00	0.39
05-Sep-06	9997	3.70	0.11
18-Sep-03	9997	7.90	0.24
09-Nov-01	9997	9.20	0.28
14-Oct-02	9997	9.70	0.29
31-Oct-05	7020	10.25	0.31
15-Apr-04	9997	7.40	0.22
21-Jun-05	9997	12.20	0.37
27-Aug-02	9997	12.60	0.38
09-Sep-04	9997	8.70	0.26
01-Jun-06	9997	10.10	0.30
15-Sep-03	9997	10.50	0.31
17-May-06	7020	5.05	0.15
26-Sep-06	9997	8.80	0.26
16-Aug-00	9997	8.40	0.25
07-Sep-05	7020	5.90	0.17
20-Aug-05	0019	7.75	0.23
01-Oct-05	0019	11.60	0.34
08-Oct-02	9997	7.40	0.22
27-Nov-05	9997	2.20	0.06
06-Jul-05	9997	9.00	0.26
04-May-05	0019	12.10	0.35
10-Jun-06	9997	6.00	0.17
07-Sep-05	9997	7.70	0.22
26-May-02	9997	7.50	0.22
17-Dec-04	0019	11.05	0.32
01-Oct-05	7020	9.50	0.27
27-Apr-04	0019	12.20	0.35
10-Aug-00	9997	6.90	0.20
29-Sep-06	9997	11.30	0.32
24-May-00	9997	10.80	0.30
03-May-00	9997	9.10	0.25
03-May-04	0019	10.10	0.28
09-Oct-00	9997	3.60	0.10
12-Apr-00	9997	11.70	0.31
07-Oct-05	0019	9.70	0.26
04-Aug-03	9997	11.60	0.31
27-Jul-05	0019	9.90	0.26

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
03-Oct-04	9997	14.90	0.39
02-Sep-02	9997	11.90	0.31
28-Jun-06	9997	8.20	0.22
02-Jul-04	9997	6.50	0.17
23-Nov-03	9997	17.20	0.45
26-Sep-06	7020	10.05	0.26
06-Oct-04	0019	15.90	0.41
07-Jul-06	9997	4.90	0.13
20-Aug-05	7020	4.25	0.11
22-Aug-03	9997	19.00	0.49
18-Nov-05	9997	5.30	0.13
02-Jul-04	0019	7.90	0.20
18-Jul-05	9997	12.10	0.30
21-Jun-05	7020	13.75	0.34
02-Jun-04	9997	9.80	0.24
21-Jun-05	0019	14.85	0.37
05-Nov-04	9997	11.10	0.27
13-Aug-04	0019	14.30	0.34
25-Sep-05	0019	10.95	0.26
01-Oct-01	9997	8.60	0.20
04-Aug-00	9997	14.20	0.33
21-Jul-05	0019	16.60	0.37
25-Jun-06	9997	14.40	0.32
19-Sep-05	0019	16.50	0.36
18-Sep-04	0019	13.35	0.29
13-Oct-05	7020	7.95	0.17
27-Jun-05	0019	9.55	0.20
07-Feb-06	9997	8.00	0.17
15-Oct-04	9997	12.70	0.27
18-Nov-05	0019	8.95	0.19
03-May-03	9997	13.10	0.27
14-Jul-03	9997	23.50	0.48
22-Jul-06	7020	9.90	0.20
03-Sep-03	9997	9.10	0.18
05-Nov-04	0019	20.05	0.40
07-Sep-05	0019	12.30	0.24
03-Apr-04	0019	4.10	0.07
22-Jul-06	9997	12.10	0.22
27-Sep-04	9997	13.00	0.23
14-Apr-06	9997	16.00	0.25
18-Nov-05	7020	7.95	0.09
30-May-00	9997	12.10	0.12
28-Mar-04	0019	7.45	0.06
30-Oct-04	0019	9.75	0.03

Date	Site ID	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Nitrate ( $\mu\text{g}/\text{m}^3$ )
08-Jul-04	0019	7.05	0.00

**Table 6**  
**Maximum and Average 24-Hour PM<sub>2.5</sub> Concentrations by Month**  
**for Maricopa County 2000-2006**

Month	Year	Max. PM <sub>2.5</sub>	Avg. PM <sub>2.5</sub>
November	2000	35.00	17.13
November	2001	25.20	11.37
November	2002	21.70	11.87
November	2003	21.60	11.79
November	2004	38.00	14.41
November	2005	29.10	12.37
December	2000	54.10	23.45
December	2001	49.00	20.17
December	2002	45.90	22.08
December	2003	31.50	14.38
December	2004	35.10	17.55
December	2005	49.20	20.12
January	2000	37.60	20.18
January	2001	63.40	16.36
January	2002	55.30	17.69
January	2003	29.70	17.56
January	2004	28.60	11.99
January	2005	56.70	13.74
January	2006	28.80	13.99
February	2000	24.20	12.00
February	2001	30.20	11.26
February	2002	29.70	11.70
February	2003	19.90	10.59
February	2004	19.00	9.98
February	2005	24.30	9.19
February	2006	23.40	12.31
March	2000	16.00	9.32
March	2001	21.70	8.77
March	2002	81.10	9.03
March	2003	13.00	6.98
March	2004	14.00	8.74
March	2005	15.20	8.06
March	2006	13.20	7.10
April	2000	17.80	9.95
April	2001	16.00	8.23
April	2002	13.30	9.06
April	2003	11.70	6.63
April	2004	13.00	7.20
April	2005	18.50	9.63
April	2006	28.10	10.15
May	2000	14.90	9.58

Month	Year	Max. PM <sub>2.5</sub>	Avg. PM <sub>2.5</sub>
May	2001	14.00	7.65
May	2002	14.80	11.27
May	2003	19.60	10.95
May	2004	11.60	7.79
May	2005	23.60	10.13
May	2006	25.20	9.18
June	2000	75.40	8.44
June	2001	10.40	7.38
June	2002	13.50	10.00
June	2003	12.20	8.04
June	2004	11.60	8.18
June	2005	17.10	10.11
June	2006	22.20	10.91
July	2000	13.60	6.54
July	2001	30.30	6.96
July	2002	13.80	9.06
July	2003	48.40	12.17
July	2004	10.50	7.44
July	2005	24.80	9.39
July	2006	20.00	9.41
August	2000	22.60	8.55
August	2001	11.50	7.40
August	2002	13.30	9.34
August	2003	19.00	7.52
August	2004	29.90	8.94
August	2005	12.70	7.66
August	2006	10.50	7.09
September	2000	12.00	8.41
September	2001	12.60	7.51
September	2002	13.00	8.89
September	2003	12.00	8.39
September	2004	21.00	10.99
September	2005	20.20	9.65
September	2006	20.10	7.92
October	2000	14.70	7.98
October	2001	19.80	10.41
October	2002	16.60	9.93
October	2003	25.90	11.26
October	2004	17.80	10.55
October	2005	16.10	9.23

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## **Appendix G**

**Excerpts from the Maricopa County Air Quality Department's 2005 PM<sub>10</sub>  
Emissions Inventory**

2005 Periodic Emissions Inventory  
for  
PM<sub>10</sub>

for the  
Maricopa County, Arizona, Nonattainment Area

**PUBLIC REVIEW DRAFT**

**January 23, 2007**

This 2005 PM<sub>10</sub> emissions inventory will serve as the basis for the Five Percent Plan projected 2007, 2008, and 2009 PM<sub>10</sub> emissions inventories. MCAQD will hold a public workshop to discuss the draft 2005 Periodic Emissions Inventory for PM<sub>10</sub>. The workshop will be held from 9–11 AM at the Department's offices at 1001 N. Central Ave., Suite 560, on Tuesday, Jan. 30, 2007.

MCAQD is accepting written comments on this document inventory through February 22, 2007. Comments may be submitted to:

Maricopa County Air Quality Department  
Emissions Inventory Unit  
1001 N. Central Avenue, Suite 595  
Phoenix, AZ 85004  
e-mail: [EmisInv@mail.maricopa.gov](mailto:EmisInv@mail.maricopa.gov)

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Appendix 5 (will be included in future draft)

**Table 1.6–10. Annual and typical daily emissions from all sources in Maricopa County.**

Section	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM10	PM2.5	NOx	SOx	NH3	PM10	PM2.5	NOx	SOx	NH3
<b>Point Sources</b>	2,317.86	1,373.39	284.94	2,870.87	273.10	15,005.5	8,954.8	1,792.7	17,165.6	1,535.6
<b>Area Sources:</b>										
<i><b>Fuel combustion</b></i>										
Ind. natural gas	16.51	16.51	308.43	1.30	6.81	105.9	105.9	1,977.1	8.3	43.7
Ind. fuel oil	247.82	247.82	3,443.60	329.29	14.18	1,588.6	1,588.6	22,074.4	2,110.8	90.9
C/I natural gas	60.15	60.15	1,146.39	4.72	3.79	385.6	385.6	7,348.6	30.3	24.3
C/I fuel oil	76.06	76.06	1,110.79	92.05	2.76	487.6	487.6	7,120.5	590.1	17.7
Resident. natural gas	62.59	62.59	774.12	4.94		342.9	342.9	4,241.7	27.1	
Resident. wood	230.85	214.69	17.35	2.67		3,057.6	2,843.6	229.8	35.3	
Resident. fuel oil	0.01	0.01	0.66	0.26		0.2	0.2	8.7	3.4	
<b>All combustion</b>	<b>694.01</b>	<b>677.85</b>	<b>6,801.33</b>	<b>435.23</b>	<b>27.55</b>	<b>5,968.4</b>	<b>5,754.4</b>	<b>43,000.7</b>	<b>2,805.4</b>	<b>176.6</b>
<i><b>Industrial Processes</b></i>										
Chemical Mfg.	119.90	92.69	0.39	0.21	0.28	922.3	713.0	3.0	1.6	2.2
Food Products										
Commercial Cooking	1,527.98	1,416.96				8,395.5	7,785.5			
Grain Handling	11.44	2.50				86.2	19.1			
Ammonia Storage					1,695.98					10,871.7
Secondary Metal Prod.	24.91	21.72	4.53	0.05	1.72	158.1	135.2	25.0	0.4	13.2
Mineral Processes (Concrete batch, etc.)	305.37	168.58				2,131.7	1,139.1			
Mining & Quarry (Sand & gravel)	63.01	17.35				409.6	111.8			
Wood Products	164.64	111.45				1,284.1	873.9			
Rubber/Plastics Mfg.	1,514.45	1,502.89				11,649.6	11,560.7			
Fabricated metal Mfg.	123.39	108.72				1,488.0	1,338.6			
Construction	39,279.55	3,927.95				301,874.0	30,187.4			
Electric Equip. Mfg.	13.14	4.69	0.01	3.98	0.96	101.1	36.0	0.1	30.6	7.4
ADEQ Portables	101.70	42.18	554.60	142.20		844.2	389.8	5,377.5	1,431.7	
Unpaved road travel	167.58	65.12				1,120.3	434.0			
Industrial Proc. NEC	16.79	10.65	4.58	0.01	0.80	129.9	71.6	26.6	0.0	4.6
<b>All Ind. Processes</b>	<b>43,433.85</b>	<b>7,493.45</b>	<b>564.10</b>	<b>146.44</b>	<b>1,699.75</b>	<b>330,594.5</b>	<b>54,795.8</b>	<b>5,432.2</b>	<b>1,464.4</b>	<b>10,899.1</b>
<i><b>Waste Treatment/Disp.</b></i>										
On-site Incineration	0.38	0.18	2.54	0.03		3.4	1.7	19.9	0.3	
Open Burning	26.62	26.62	7.19			261.2	261.2	70.3		
Landfills	6.79	4.05	6.50	1.11		39.5	23.5	36.3	6.3	
POTWs					1,310.85					7,182.7
Other waste	49.00	31.07	4.15	5.01		371.8	234.8	22.8	27.5	
<b>All Waste Treat/Disp.</b>	<b>82.80</b>	<b>61.93</b>	<b>20.38</b>	<b>6.14</b>	<b>1,310.85</b>	<b>675.9</b>	<b>521.3</b>	<b>149.4</b>	<b>34.0</b>	<b>7,182.7</b>
<i><b>Misc. Area Sources</b></i>										
Wildfires	112,628.23	96,595.74	24,850.36	6,813.81	5,210.56	755,894.2	648,293.6	166,780.9	45,730.3	34,970.2
Prescribed Fires	0.06	0.06	0.05	0.01	0.00	120.0	120.0	93.0	25.5	7.5
Structure Fires	22.53	22.53	2.92			123.8	123.8	16.0		
Vehicle Fires	26.41	26.41	1.06			144.7	144.7	5.8		
Aircraft Eng. Testing	0.15	0.12	4.61	1.89		1.1	0.9	35.4	14.5	
Tilling	2,913.73	437.06				30,241.4	4,536.2			
Harvesting	145.48	21.82				3,489.9	523.5			
Travel on unpaved agricultural roads	2,041.71	204.17				13,087.9	1,308.8			
Cotton Ginning	0.08	0.02				0.6	0.2			
Fertilizer Application										
Livestock	645.27	70.98				3,535.7	388.9			
Crematories	0.96	0.64	11.45	1.46		7.4	4.9	88.0	11.3	
Accidental releases	1.03	1.03				5.6	5.6			
Humans					1,039.60					5,696.5
Leaf blowers fugitive	841.66	317.65				4,611.8	1,740.6			
Offroad rec. vehicles fugitive dust	9,994.00	999.00				54,764.0	5,476.0			
Travel on unpaved parking lots	4,888.00	489.00				26,781.0	2,678.0			
Windblown dust	7,090.71					38,853.2				
<b>All Misc. Area Sources</b>	<b>141,240.00</b>	<b>99,186.24</b>	<b>24,870.43</b>	<b>6,817.17</b>	<b>6,250.17</b>	<b>931,662.4</b>	<b>665,345.7</b>	<b>167,019.2</b>	<b>45,781.5</b>	<b>40,674.2</b>
<b>All Area Sources:</b>	<b>185,450.67</b>	<b>107,419.46</b>	<b>32,256.24</b>	<b>7,404.99</b>	<b>9,288.31</b>	<b>1,268,901.3</b>	<b>726,417.1</b>	<b>215,601.5</b>	<b>50,085.3</b>	<b>58,932.6</b>

**Table 1.6–10 (continued). Annual and typical daily emissions from all sources in Maricopa County.**

Section	Annual emissions (tons/yr)					Typical daily emissions (lbs/day)				
	PM10	PM2.5	NOx	SOx	NH3	PM10	PM2.5	NOx	SOx	NH3
<b>Nonroad Sources:</b>										
Agricultural equipment	39.21	38.03	386.34	5.95	0.73	251.4	243.8	2,476.5	38.2	4.7
Airport GSE	16.50	15.70	467.82	14.71		90.4	86.0	2,563.4	80.6	
Commercial equipment	119.34	114.47	1,449.72	17.32	23.18	765.0	733.8	9,293.1	111.0	148.6
Construction and mining equipment	1,354.26	1,311.26	16,016.62	287.07	31.22	8,681.1	8,405.5	102,670.7	1,840.2	200.1
Industrial equipment	110.02	107.01	3,316.67	26.63	79.21	705.2	686.0	21,260.7	170.7	507.7
Lawn and garden equipment	178.22	165.18	843.10	9.53	21.21	1,226.0	1,135.4	5,882.8	64.1	155.5
Pleasure craft	11.33	10.45	70.58	0.71	1.49	152.5	140.7	950.0	9.5	20.1
Railway maintenance equipment	1.20	1.16	9.27	0.14	0.02	8.3	8.1	64.2	1.0	0.1
Recreational equipment	42.29	38.95	59.99	0.68	1.97	361.4	332.9	512.7	5.8	16.8
Aircraft	6,738.82	4,617.56	4,939.17	343.49		36,925.0	25,301.7	27,063.9	1,882.1	
Locomotives	74.45	65.28	2,955.24	173.18	4.57	407.9	357.7	16,193.1	948.9	25.0
<b>All Nonroad Sources</b>	<b>8,685.62</b>	<b>6,485.07</b>	<b>30,514.52</b>	<b>879.41</b>	<b>163.58</b>	<b>49,574.4</b>	<b>37,431.7</b>	<b>188,931.3</b>	<b>5,152.2</b>	<b>1,078.7</b>
<b>Onroad Sources:</b>										
Exhaust	1,092.00	1,007.00	66,187.00	1,611.00	3,011.00	5,982.0	5,516.0	362,669.0	8,827.0	16,496.0
Tire wear	320.00	80.00				1,755.0	439.0			
Brake wear	413.00	175.00				2,264.0	960.0			
Paved road fugitive dust	14,619.00	2,193.00				80,104.0	12,015.0			
Unpaved road fugitive dust	8,903.00	890.00				48,781.0	4,879.0			
<b>All Mobile Sources:</b>	<b>25,347.00</b>	<b>4,345.00</b>	<b>66,187.00</b>	<b>1,611.00</b>	<b>3,011.00</b>	<b>138,886.0</b>	<b>23,809.0</b>	<b>362,669.0</b>	<b>8,827.0</b>	<b>16,496.0</b>
<b>Biogenic Sources:</b>			<b>3,321.00</b>					<b>18,197.0</b>		
<b>TOTAL, All Sources:</b>	<b>221,801.15</b>	<b>119,622.92</b>	<b>132,563.71</b>	<b>12,766.27</b>	<b>12,736.00</b>	<b>1,472,367.2</b>	<b>796,612.6</b>	<b>787,191.6</b>	<b>81,230.1</b>	<b>78,042.8</b>

## 5. Onroad Mobile Sources

### 5.1 Introduction

Onroad mobile source emission estimates have been calculated for particulate matter for the 2005 Periodic Particulate Matter Emissions Inventory. For the purposes of this particulate matter inventory, the following pollutants were included: PM<sub>10</sub>, PM<sub>2.5</sub>, nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), and ammonia (NH<sub>3</sub>). PM<sub>10</sub> refers to all particles less than or equal to 10 micrometers in diameter, about one-seventh the diameter of a human hair. PM<sub>2.5</sub> refers to particles less than or equal to 2.5 micrometers in diameter.

Onroad mobile source emissions are estimated for the PM<sub>10</sub> nonattainment area (approximately 3,000 square miles), as well as for Maricopa County (approximately 9,000 square miles). Emission factors were calculated using MOBILE6.2 and AP-42. MOBILE6.2 is the latest version in a series of models developed by the US Environmental Protection Agency (EPA) for the purpose of estimating motor vehicle emission factors. AP-42 is the EPA Compilation of Air Pollutant Emission Factors. AP-42 emission factors were used to calculate fugitive dust emission factors, while the MOBILE6.2 model was used to estimate all other emission factors. The resulting emission factors were multiplied by the estimates of vehicle miles of travel (VMT) to generate emission estimates.

The 2005 motor vehicle exhaust, tire wear, and brake wear emissions were estimated using the MOBILE6.2 model. The modeling accounted for the oxygenated fuel and vehicle inspection/maintenance (I/M) programs in existence in Maricopa County in 2005. Fuel use assumptions for 2005, including oxygen content and Reid Vapor Pressure (RVP), were based on actual July 2005 testing results provided by the Arizona Department of Weight and Measures. MOBILE6.2 calculations reflected a 91.6 percent participation in the I/M program.

The 2005 vehicle miles of travel (VMT) used in developing the onroad mobile source emissions were derived from the latest 2005 traffic assignment produced by the MAG travel demand model (i.e., EMME2). The 2005 VMT was split into 28 vehicle classes. The VMT by vehicle class was derived using the VMT mix produced by MOBILE6.2. The MOBILE6.2 VMT mix is based on July 2003 vehicle registration data for Maricopa County obtained from the Arizona Department of Transportation. The VMT by vehicle class was multiplied by the appropriate MOBILE6.2 emission factors to produce 2005 onroad exhaust, tire wear, and brake wear emissions.

Paved road fugitive dust emissions were estimated using emission factors from AP-42 applied to VMT from the 2005 traffic assignment produced by the MAG EMME2 travel demand model. The 2005 VMT for freeways, high traffic arterials, and low traffic arterials were derived from the traffic assignment. Low traffic arterials are assumed to carry 5,000 or fewer vehicles on an average weekday, while high traffic arterials carry more than 5,000 vehicles per weekday. These VMTs were multiplied by the appropriate paved road particulate emission factors from AP-42. The paved road fugitive dust particulate emission factors were derived from the AP-42 equation for paved roads, assuming silt loadings from the Serious Area PM<sub>10</sub> Plan and a mean vehicle weight of three tons. GIS was applied to obtain VMT estimates for the PM<sub>10</sub> nonattainment area and Maricopa County.



Unpaved road VMT was developed using the mileage for low and high traffic unpaved roads derived from the unpaved road inventory in the Serious Area PM<sub>10</sub> Plan. Low traffic unpaved roads are assumed to carry an average of four vehicles per day, while high traffic unpaved roads carry an average of 120 vehicles per day. The unpaved road mileage used in developing the 2005 particulate emission inventory assumes that all commitments to pave unpaved roads in the Serious Area PM<sub>10</sub> Plan have been implemented. Low and high traffic unpaved road VMTs were multiplied by the appropriate AP-42 emission factor to produce unpaved road particulate emissions. The unpaved road particulate emission factors were derived from the AP-42 equation for publicly accessible unpaved roads, assuming a silt content of 11.9%, soil moisture content of 0.5%, a mean vehicle weight of three tons, and an average speed of 25 mph.

The main references for preparing the onroad mobile source portion of the 2005 emissions inventory were:

- Emission Inventory Requirements for Ozone State Implementation Plans, EPA-450/4-91-010, March 1991,
- Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation, US EPA, January 2002,
- User's Guide to MOBILE6.1 and MOBILE6.2 (Mobile Source Emission Factor Model), EPA420-R-03-010, August 2003, and
- Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA-450/4-81/026d (Revised), 1992.

## 5.2 VMT estimation

MAG prepared the 2005 vehicle miles of travel (VMT) estimates for the PM<sub>10</sub> nonattainment area and Maricopa County. The source of data for these estimates is the 2005 traffic assignment prepared by MAG using the EMME2 travel demand model. Highway Performance Monitoring System (HPMS) data for 2005 prepared by the Arizona Department of Transportation was not available in time to be used for the 2005 periodic particulate matter emissions inventory.

The distribution of VMT by vehicle class for the PM<sub>10</sub> nonattainment area was derived from the MAG EMME2 traffic assignment and MOBILE6.2 runs for 2005. The output of the traffic assignment was evaluated using GIS to obtain VMT for the PM<sub>10</sub> nonattainment area and Maricopa County. Since information provided by the 2005 traffic assignment does not cover the far western and far northeastern areas of Maricopa County, 2005 VMT for Maricopa County was obtained by multiplying the 2005 traffic assignment VMT by the ratio of the 2002 HPMS VMT for Maricopa County to the 2002 traffic assignment VMT for Maricopa County. The traffic assignment VMTs shown below represent annual average daily traffic volumes. The ratio applied to obtain Maricopa County VMT was calculated as follows:

Maricopa County 2002 HPMS VMT = 73,579,000 miles per day

Maricopa County 2002 traffic assignment VMT = 71,988,181 miles per day

Maricopa County 2005 traffic assignment VMT = 80,374,602 miles per day

Ratio = 73,579,000 / 71,988,181 = 1.02

2005 VMT for Maricopa County = 1.02 x 80,374,602 = 82,150,747 miles per day



VMTs for the PM<sub>10</sub> nonattainment area and Maricopa County were split by vehicle class using VMT mix data obtained from the MOBILE6.2 run. The VMT estimates by 28 vehicle class categories for the PM<sub>10</sub> nonattainment area and Maricopa County are shown in Table 5.2–1.

**Table 5.2–1. 2005 daily VMT (vehicle miles of travel) by vehicle class**

<b>Vehicle Type</b>	<b>PM<sub>10</sub> NAA</b>	<b>Maricopa County</b>
LDGV	32,364,131	33,951,479
LDGT1	5,937,079	6,228,272
LDGT2	19,761,545	20,730,780
LDGT3	6,579,349	6,902,043
LDGT4	3,023,368	3,171,653
HDGV2B	2,294,940	2,407,498
HDGV3	78,326	82,167
HDGV4	31,330	32,867
HDGV5	93,991	98,601
HDGV6	195,814	205,418
HDGV7	78,326	82,167
HDGV8A	0	0
HDGV8B	0	0
MC	375,963	394,402
LDDV	62,660	65,734
LDDT12	23,498	24,650
LDDT34	140,986	147,901
HDDV2B	720,595	755,938
HDDV3	219,312	230,068
HDDV4	234,977	246,502
HDDV5	109,656	115,034
HDDV6	556,112	583,387
HDDV7	806,754	846,322
HDDV8A	971,237	1,018,873
HDDV8B	3,430,661	3,598,922
HDGB	15,665	16,433
HDDBT	70,493	73,950
HDDBS	133,153	139,684
<b>Total</b>	<b>78,309,918</b>	<b>82,150,747</b>

VMT for estimating fugitive dust emissions from paved roads was also estimated using data from the 2005 EMME2 traffic assignment. Roadway silt loading measurements used in the Serious Area PM<sub>10</sub> Plan reflect three silt loading classifications: freeways, high traffic arterials (greater than or equal to 5,000 vehicles per average weekday), and low traffic arterials (less than 5,000 vehicles per average weekday). GIS was applied to extract VMT for the PM<sub>10</sub> modeling area from the MAG 2005 traffic assignment. The PM<sub>10</sub> modeling area for the Serious Area PM<sub>10</sub> Plan is a rectangle that encompasses the portion of the PM<sub>10</sub> nonattainment area in Maricopa County. The VMT for freeways and high and low traffic arterials in the PM<sub>10</sub> modeling area is shown in Table 5.2–2. These VMTs represent annual average daily traffic volumes. All travel on local streets is included in the low traffic arterial category below.

**Table 5.2–2. 2005 VMT by silt loading category on paved roads in the PM<sub>10</sub> modeling area.**

	VMT			Total
	Freeways	High Traffic Arterials	Low Traffic Arterials	
PM <sub>10</sub> Modeling Area	27,929,802	40,164,352	9,688,202	77,782,356

The miles of unpaved roads used to estimate VMT for unpaved roads was derived from the Serious Area PM<sub>10</sub> Plan (MAG, 2000). The unpaved road mileages shown in Table 5.2–3 have been reduced to account for control measures to Reduce Particulate Emissions from Unpaved Roads and Alleys in the Plan. The Plan classifies the miles of unpaved roads as low traffic and high traffic. Low traffic unpaved roads have an annual average traffic level of 4 vehicles per day; high traffic unpaved roads have an annual average traffic level of 120 vehicles per day. Applying these traffic volumes to the unpaved road mileages, after implementation of committed measures in the Plan, results in the daily VMTs for the PM<sub>10</sub> modeling area shown in Table 5.2–3. The PM<sub>10</sub> modeling area is a rectangle that includes the portion of the PM<sub>10</sub> nonattainment area located in Maricopa County.

**Table 5.2–3. 2005 unpaved road mileages and VMT in the PM<sub>10</sub> modeling area.**

Unpaved Road Type	2005	
	Miles	Daily VMT
High Traffic	224.3	26,916
Low Traffic	1,129.2	4,517
Total	1,353.5	31,433

To estimate paved and unpaved road emissions for Maricopa County and the entire PM<sub>10</sub> nonattainment area, including Apache Junction in Pinal County, the emissions for the PM<sub>10</sub> modeling area were multiplied by the ratio of the total daily VMT in Maricopa County (or the PM<sub>10</sub> nonattainment area) to the total daily VMT in the PM<sub>10</sub> modeling area. GIS was applied to extract the total VMTs for Maricopa County and the PM<sub>10</sub> nonattainment area from the 2005 MAG traffic assignment. These VMTs represent annual average daily traffic volumes. The resultant VMTs and ratios are shown in Table 5.2–4.

**Table 5.2–4. VMTs for the PM<sub>10</sub> modeling area, PM<sub>10</sub> nonattainment area, and Maricopa County.**

Area	Total Daily VMT
PM <sub>10</sub> Modeling Area (MA)	77,782,356
PM <sub>10</sub> Nonattainment Area (NA)	78,309,918
Maricopa County (MC)	82,150,747
Ratio (NA/MA)	1.007
Ratio (MC/MA)	1.056

### 5.3 Vehicle speed

Vehicle speeds have no effect on the emission factors for exhaust particulate matter, reentrained dust from paved roads, brake wear, tire wear, or exhaust ammonia (NH<sub>3</sub>) and have only a very slight effect on the pollutants, SO<sub>4</sub> and SO<sub>2</sub>. However, speeds can have a significant effect on NO<sub>x</sub> exhaust emissions and re-entrained dust from unpaved roads. The MOBILE6.2 default speeds were assumed for the NO<sub>x</sub> emission calculations and 25 miles per hour was assumed on all unpaved roads.

## 5.4 Emission factor estimation procedures

PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NH<sub>3</sub>, and oxides of nitrogen (NO<sub>x</sub>) vehicle exhaust emission factors were calculated using MOBILE6.2. The PM<sub>10</sub> and PM<sub>2.5</sub> non-exhaust components of tire wear and brake wear were also estimated using MOBILE6.2. The PM<sub>10</sub> and PM<sub>2.5</sub> estimates include the components lead, elemental carbon from diesel exhaust, organic carbon from diesel exhaust, sulfate portion, and carbon portion of gasoline exhaust. MOBILE6.2 is the latest version in a series of models developed by the U.S. EPA for the purpose of estimating motor vehicle emission factors. The MOBILE6.2 runs were executed by MAG. The contact person for the MOBILE6.2 emission estimates is Taejoo Shin (602-254-6300).

Fugitive dust emission factors were derived from AP-42. The contact person for the fugitive dust emission estimates is Cathy Arthur (602-254-6300).

### 5.4.1 *MOBILE6.2 emission factor model*

The emission factors not related to fugitive dust were calculated using MOBILE6.2. Two MOBILE6.2 runs were executed for an annual average day (24-hour period) reflecting vehicles registered locally (subject to the I/M program) and those not registered locally (not participating in the I/M program). Of the pollutants modeled for this study, the presence or lack of an I/M program only affects the modeled emission factors for NO<sub>x</sub>. Refer to Appendix 5 for portions of the actual input and output files.

The emission factors estimated with these runs were combined to reflect the actual proportions of vehicles subject to the specified levels of inspection. The term “I/M vehicles” denotes vehicles which are required to undergo an emission test and/or inspection under the Arizona Vehicle Inspection/Maintenance Program. It is important to note that participation in the I/M program is required for all vehicles registered in the nonattainment area, with the exception of certain model year and vehicle types. However, it is assumed that of the vehicles which are of an age and type subject to an I/M program, only 91.6 percent of the vehicles operating within the nonattainment area participate in the I/M program. The remaining 8.4 percent do not participate in the program. These percentages reflect the implementation of the control measures “Tougher Registration Enforcement” and “Expansion of Area A Boundaries”, described in the Revised MAG 1999 Serious Area Carbon Monoxide Plan for the Maricopa County Nonattainment Area, MAG, March 2001. In the absence of any additional data, this percentage split is assumed to apply directly to VMT as well.

#### 5.4.1.1 *MOBILE6.2 inputs*

In order to accurately reflect the state of the I/M program in the modeling area, several MOBILE6.2 runs were performed and the emission factors from those runs were weighted together. The specific model run inputs to the MOBILE6.2 model are described in Appendix 5.

#### 5.4.1.2 *MOBILE6.2 outputs*

MOBILE6.2 was executed to obtain composite emission factors in grams per mile (g/mi) for exhaust PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>2</sub>, and NH<sub>3</sub>. These values were obtained for 28 vehicle classes. The emission factors generated for 2005 are presented in the following section. Representative output runs are contained in Appendix 5. These values were then used in developing emission estimates.

### 5.4.1.3 Summary of MOBILE6.2 emission factors

MOBILE6.2 was used to generate emission factors by vehicle class in terms of gram per mile. Table 5.4–1 provides the emission factors for each vehicle class for the PM<sub>10</sub> nonattainment area and Maricopa County.

**Table 5.4–1. Emission factors by vehicle class for the PM<sub>10</sub> nonattainment area and Maricopa County.**

Vehicle Type	PM <sub>10</sub> Exh	PM <sub>10</sub> Tire	PM <sub>10</sub> Brake	PM <sub>2.5</sub> Ext	PM <sub>2.5</sub> Tire	PM <sub>2.5</sub> Brake	NO <sub>x</sub>	SO <sub>x</sub>
LDGV	0.0052	0.0080	0.0125	0.0048	0.0020	0.0053	0.766	0.020
LDGT1	0.0061	0.0080	0.0125	0.0057	0.0020	0.0053	0.788	0.026
LDGT2	0.0061	0.0080	0.0125	0.0057	0.0020	0.0053	1.043	0.026
LDGT3	0.0066	0.0080	0.0125	0.0061	0.0020	0.0053	1.200	0.034
LDGT4	0.0066	0.0080	0.0125	0.0061	0.0020	0.0053	1.590	0.034
HDGV2B	0.0616	0.0080	0.0125	0.0547	0.0020	0.0053	4.024	0.049
HDGV3	0.0671	0.0120	0.0125	0.0583	0.0030	0.0053	4.442	0.053
HDGV4	0.0731	0.0120	0.0125	0.0586	0.0030	0.0053	4.769	0.054
HDGV5	0.0602	0.0120	0.0125	0.0505	0.0030	0.0053	4.844	0.062
HDGV6	0.0593	0.0120	0.0125	0.0500	0.0030	0.0053	4.788	0.061
HDGV7	0.0605	0.0120	0.0125	0.0507	0.0030	0.0053	5.375	0.067
HDGV8A	0.0620	0.0360	0.0125	0.0513	0.0090	0.0053	5.961	0.071
HDGV8B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.000
MC	0.0208	0.0040	0.0125	0.0145	0.0010	0.0053	1.240	0.010
LDDV	0.1857	0.0080	0.0125	0.1711	0.0020	0.0053	1.563	0.070
LDDT12	0.3148	0.0080	0.0125	0.2899	0.0020	0.0053	2.736	0.069
LDDT34	0.1079	0.0080	0.0125	0.0998	0.0020	0.0053	1.147	0.115
HDDV2B	0.1405	0.0080	0.0125	0.1301	0.0020	0.0053	3.996	0.152
HDDV3	0.1252	0.0120	0.0125	0.1162	0.0030	0.0053	4.443	0.169
HDDV4	0.1286	0.0120	0.0125	0.1194	0.0030	0.0053	5.286	0.192
HDDV5	0.1210	0.0120	0.0125	0.1124	0.0030	0.0053	5.642	0.199
HDDV6	0.2371	0.0120	0.0125	0.2194	0.0030	0.0053	7.711	0.225
HDDV7	0.2427	0.0120	0.0125	0.2247	0.0030	0.0053	9.578	0.260
HDDV8A	0.2961	0.0360	0.0125	0.2741	0.0090	0.0053	12.217	0.298
HDDV8B	0.3127	0.0360	0.0125	0.2895	0.0090	0.0053	14.339	0.313
HDGB	0.1377	0.0120	0.0125	0.0995	0.0030	0.0053	7.831	0.079
HDDBT	0.5888	0.0120	0.0125	0.5442	0.0030	0.0053	17.002	0.455
HDDBS	0.6102	0.0120	0.0125	0.5631	0.0030	0.0053	11.940	0.315

### 5.4.1.4 MOBILE6.2 emission estimates

The annual average daily VMT shown in Table 5.2–1 was multiplied by the appropriate emission factor shown in Table 5.2–1 for each vehicle class to calculate exhaust emissions. Calculations for brake wear and tire wear involved the multiplication of the VMT by appropriate emission factors from MOBILE6.2 also shown in the table above.

Tables 5.4–2 through 5.4–3 show the resultant PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>2</sub>, and NH<sub>3</sub> emissions for each vehicle class in the PM<sub>10</sub> nonattainment area and Maricopa County, respectively. The emissions are shown in terms of metric tons per day.

Tables 5.4-4 and 5.4-5 show the same emissions on an annual basis in metric tons per year. In Tables 5.4-1 through 5.4-5, the abbreviation "Ext" refers to exhaust particulate emissions, "Tire" refers to tire wear particulate emissions, and "Brake" refers to brake wear particulate emissions. NO<sub>x</sub> and SO<sub>x</sub> refer to exhaust emissions.

**Table 5.4-2. Daily PM<sub>10</sub> nonattainment area emissions by vehicle class (metric tons/day).**

Vehicle type	PM <sub>10</sub> Ext	PM <sub>10</sub> Tire	PM <sub>10</sub> Brake	PM <sub>2.5</sub> Ext	PM <sub>2.5</sub> Tire	PM <sub>2.5</sub> Brake	PM <sub>10</sub> Total	PM <sub>2.5</sub> Total	NO <sub>x</sub>	SO <sub>x</sub>	NH <sub>3</sub>
LDGV	0.168	0.259	0.405	0.155	0.065	0.172	0.832	0.392	24.788	0.660	3.285
LDGT1	0.036	0.047	0.074	0.034	0.012	0.031	0.158	0.077	4.679	0.156	0.594
LDGT2	0.121	0.158	0.247	0.113	0.040	0.105	0.526	0.257	20.611	0.518	1.976
LDGT3	0.043	0.053	0.082	0.040	0.013	0.035	0.178	0.088	7.895	0.225	0.651
LDGT4	0.020	0.024	0.038	0.018	0.006	0.016	0.082	0.041	4.807	0.103	0.299
HDGV2B	0.141	0.018	0.029	0.126	0.005	0.012	0.188	0.142	9.234	0.112	0.104
HDGV3	0.005	0.001	0.001	0.005	0.000	0.000	0.007	0.005	0.348	0.004	0.004
HDGV4	0.002	0.000	0.000	0.002	0.000	0.000	0.003	0.002	0.149	0.002	0.001
HDGV5	0.006	0.001	0.001	0.005	0.000	0.000	0.008	0.006	0.455	0.006	0.004
HDGV6	0.012	0.002	0.002	0.010	0.001	0.001	0.016	0.011	0.938	0.012	0.009
HDGV7	0.005	0.001	0.001	0.004	0.000	0.000	0.007	0.005	0.421	0.005	0.004
HDGV8A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HDGV8B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MC	0.008	0.002	0.005	0.005	0.000	0.002	0.014	0.008	0.466	0.004	0.004
LDDV	0.012	0.001	0.001	0.011	0.000	0.000	0.013	0.011	0.098	0.004	0.000
LDDT12	0.007	0.000	0.000	0.007	0.000	0.000	0.008	0.007	0.064	0.002	0.000
LDDT34	0.015	0.001	0.002	0.014	0.000	0.001	0.018	0.015	0.162	0.016	0.001
HDDV2B	0.101	0.006	0.009	0.094	0.001	0.004	0.116	0.099	2.879	0.110	0.019
HDDV3	0.027	0.003	0.003	0.025	0.001	0.001	0.033	0.027	0.974	0.037	0.006
HDDV4	0.030	0.003	0.003	0.028	0.001	0.001	0.036	0.030	1.242	0.045	0.006
HDDV5	0.013	0.001	0.001	0.012	0.000	0.001	0.016	0.013	0.619	0.022	0.003
HDDV6	0.132	0.007	0.007	0.122	0.002	0.003	0.145	0.127	4.288	0.125	0.015
HDDV7	0.196	0.010	0.010	0.181	0.002	0.004	0.216	0.188	7.727	0.210	0.022
HDDV8A	0.288	0.035	0.012	0.266	0.009	0.005	0.335	0.280	11.866	0.290	0.026
HDDV8B	1.073	0.124	0.043	0.993	0.031	0.018	1.239	1.042	49.192	1.075	0.093
HDGB	0.002	0.000	0.000	0.002	0.000	0.000	0.003	0.002	0.123	0.001	0.001
HDDBT	0.042	0.001	0.001	0.038	0.000	0.000	0.043	0.039	1.199	0.032	0.002
HDDBS	0.081	0.002	0.002	0.075	0.000	0.001	0.085	0.076	1.590	0.042	0.004
Total	<b>2.587</b>	<b>0.759</b>	<b>0.979</b>	<b>2.385</b>	<b>0.190</b>	<b>0.415</b>	<b>4.324</b>	<b>2.990</b>	<b>156.814</b>	<b>3.817</b>	<b>7.133</b>

**Table 5.4–3. Daily Maricopa County emissions by vehicle class (metric tons/day).**

<b>Vehicle type</b>	<b>PM<sub>10</sub> Ext</b>	<b>PM<sub>10</sub> Tire</b>	<b>PM<sub>10</sub> Brake</b>	<b>PM<sub>2.5</sub> Ext</b>	<b>PM<sub>2.5</sub> Tire</b>	<b>PM<sub>2.5</sub> Brake</b>	<b>PM<sub>10</sub> Total</b>	<b>PM<sub>2.5</sub> Total</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>NH<sub>3</sub></b>
LDGV	0.177	0.272	0.424	0.163	0.068	0.180	0.873	0.411	26.004	0.693	3.446
LDGT1	0.038	0.050	0.078	0.036	0.012	0.033	0.166	0.081	4.909	0.163	0.623
LDGT2	0.126	0.166	0.259	0.118	0.041	0.110	0.551	0.270	21.622	0.543	2.073
LDGT3	0.046	0.055	0.086	0.042	0.014	0.037	0.187	0.092	8.282	0.236	0.683
LDGT4	0.021	0.025	0.040	0.019	0.006	0.017	0.086	0.043	5.043	0.108	0.314
HDGV2B	0.148	0.019	0.030	0.132	0.005	0.013	0.198	0.149	9.687	0.117	0.109
HDGV3	0.006	0.001	0.001	0.005	0.000	0.000	0.008	0.005	0.365	0.004	0.004
HDGV4	0.002	0.000	0.000	0.002	0.000	0.000	0.003	0.002	0.157	0.002	0.001
HDGV5	0.006	0.001	0.001	0.005	0.000	0.001	0.008	0.006	0.478	0.006	0.004
HDGV6	0.012	0.002	0.003	0.010	0.001	0.001	0.017	0.012	0.984	0.013	0.009
HDGV7	0.005	0.001	0.001	0.004	0.000	0.000	0.007	0.005	0.442	0.005	0.004
HDGV8A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HDGV8B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MC	0.008	0.002	0.005	0.006	0.000	0.002	0.015	0.008	0.489	0.004	0.004
LDDV	0.012	0.001	0.001	0.011	0.000	0.000	0.014	0.012	0.103	0.005	0.000
LDDT12	0.008	0.000	0.000	0.007	0.000	0.000	0.008	0.007	0.067	0.002	0.000
LDDT34	0.016	0.001	0.002	0.015	0.000	0.001	0.019	0.016	0.170	0.017	0.001
HDDV2B	0.106	0.006	0.009	0.098	0.002	0.004	0.122	0.104	3.021	0.115	0.020
HDDV3	0.029	0.003	0.003	0.027	0.001	0.001	0.034	0.029	1.022	0.039	0.006
HDDV4	0.032	0.003	0.003	0.029	0.001	0.001	0.038	0.031	1.303	0.047	0.007
HDDV5	0.014	0.001	0.001	0.013	0.000	0.001	0.017	0.014	0.649	0.023	0.003
HDDV6	0.138	0.007	0.007	0.128	0.002	0.003	0.153	0.133	4.498	0.131	0.016
HDDV7	0.205	0.010	0.011	0.190	0.003	0.004	0.226	0.197	8.106	0.220	0.023
HDDV8A	0.302	0.037	0.013	0.279	0.009	0.005	0.351	0.294	12.448	0.304	0.028
HDDV8B	1.125	0.130	0.045	1.042	0.032	0.019	1.300	1.093	51.605	1.128	0.097
HDGB	0.002	0.000	0.000	0.002	0.000	0.000	0.003	0.002	0.129	0.001	0.001
HDDBT	0.044	0.001	0.001	0.040	0.000	0.000	0.045	0.041	1.257	0.034	0.002
HDDBS	0.085	0.002	0.002	0.079	0.000	0.001	0.089	0.080	1.668	0.044	0.004
<b>Total</b>	<b>2.713</b>	<b>0.796</b>	<b>1.027</b>	<b>2.502</b>	<b>0.199</b>	<b>0.435</b>	<b>4.536</b>	<b>3.136</b>	<b>164.506</b>	<b>4.004</b>	<b>7.483</b>

**Table 5.4–4. Annual PM<sub>10</sub> nonattainment area emissions by vehicle class (*metric tons/year*).**

Vehicle type	PM <sub>10</sub> Ext	PM <sub>10</sub> Tire	PM <sub>10</sub> Brake	PM <sub>2.5</sub> Ext	PM <sub>2.5</sub> Tire	PM <sub>2.5</sub> Brake	PM <sub>10</sub> Total	PM <sub>2.5</sub> Total	NO <sub>x</sub>	SO <sub>x</sub>	NH <sub>3</sub>
LDGV	61.4	94.5	147.7	56.7	23.6	62.6	303.6	142.9	9,047.6	241.0	1,199.0
LDGT1	13.2	17.3	27.1	12.4	4.3	11.5	57.6	28.2	1,708.0	56.8	216.7
LDGT2	44.0	57.7	90.2	41.1	14.4	38.2	191.9	93.8	7,523.0	189.0	721.3
LDGT3	15.8	19.2	30.0	14.6	4.8	12.7	65.1	32.2	2,881.7	82.1	237.7
LDGT4	7.3	8.8	13.8	6.7	2.2	5.8	29.9	14.8	1,754.6	37.7	109.2
HDGV2B	51.6	6.7	10.5	45.8	1.7	4.4	68.8	51.9	3,370.4	40.7	37.8
HDGV3	1.9	0.3	0.4	1.7	0.1	0.2	2.6	1.9	127.0	1.5	1.3
HDGV4	0.8	0.1	0.1	0.7	0.0	0.1	1.1	0.8	54.5	0.6	0.5
HDGV5	2.1	0.4	0.4	1.7	0.1	0.2	2.9	2.0	166.2	2.1	1.5
HDGV6	4.2	0.9	0.9	3.6	0.2	0.4	6.0	4.2	342.2	4.4	3.2
HDGV7	1.7	0.3	0.4	1.4	0.1	0.2	2.4	1.7	153.7	1.9	1.3
HDGV8A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HDGV8B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MC	2.9	0.5	1.7	2.0	0.1	0.7	5.1	2.9	170.2	1.3	1.6
LDDV	4.2	0.2	0.3	3.9	0.0	0.1	4.7	4.1	35.7	1.6	0.2
LDDT12	2.7	0.1	0.1	2.5	0.0	0.0	2.9	2.5	23.5	0.6	0.1
LDDT34	5.6	0.4	0.6	5.1	0.1	0.3	6.6	5.5	59.0	5.9	0.3
HDDV2B	37.0	2.1	3.3	34.2	0.5	1.4	42.3	36.1	1,051.0	40.0	7.1
HDDV3	10.0	1.0	1.0	9.3	0.2	0.4	12.0	10.0	355.7	13.5	2.2
HDDV4	11.0	1.0	1.1	10.2	0.3	0.5	13.1	11.0	453.4	16.5	2.3
HDDV5	4.8	0.5	0.5	4.5	0.1	0.2	5.8	4.8	225.8	7.9	1.1
HDDV6	48.1	2.4	2.5	44.5	0.6	1.1	53.1	46.2	1,565.2	45.7	5.5
HDDV7	71.5	3.5	3.7	66.2	0.9	1.6	78.7	68.6	2,820.4	76.5	8.0
HDDV8A	105.0	12.8	4.4	97.2	3.2	1.9	122.2	102.2	4,330.9	105.7	9.6
HDDV8B	391.6	45.1	15.7	362.5	11.3	6.6	452.3	380.4	17,955.2	392.4	33.8
HDGB	0.8	0.1	0.1	0.6	0.0	0.0	0.9	0.6	44.8	0.5	0.3
HDDBT	15.1	0.3	0.3	14.0	0.1	0.1	15.8	14.2	437.5	11.7	0.7
HDDBS	29.7	0.6	0.6	27.4	0.1	0.3	30.8	27.8	580.3	15.3	1.3
<b>Total</b>	<b>944</b>	<b>277</b>	<b>357</b>	<b>871</b>	<b>69</b>	<b>151</b>	<b>1,578</b>	<b>1,091</b>	<b>57,237</b>	<b>1,393</b>	<b>2,603</b>

**Table 5.4-5. Annual Maricopa County emissions by vehicle class (metric tons/year).**

Vehicle type	PM <sub>10</sub> Ext	PM <sub>10</sub> Tire	PM <sub>10</sub> Brake	PM <sub>2.5</sub> Ext	PM <sub>2.5</sub> Tire	PM <sub>2.5</sub> Brake	PM <sub>10</sub> Total	PM <sub>2.5</sub> Total	NO <sub>x</sub>	SO <sub>x</sub>	NH <sub>3</sub>
LDGV	64.4	99.1	154.9	59.5	24.8	65.7	318.5	149.9	9,491.3	252.8	1,257.8
LDGT1	13.9	18.2	28.4	13.0	4.5	12.0	60.5	29.6	1,791.7	59.6	227.3
LDGT2	46.2	60.5	94.6	43.1	15.1	40.1	201.3	98.4	7,892.0	198.2	756.7
LDGT3	16.6	20.2	31.5	15.4	5.0	13.4	68.3	33.8	3,023.1	86.2	249.4
LDGT4	7.6	9.3	14.5	7.1	2.3	6.1	31.4	15.5	1,840.7	39.6	114.6
HDGV2B	54.1	7.0	11.0	48.1	1.8	4.7	72.1	54.5	3,535.7	42.7	39.6
HDGV3	2.0	0.4	0.4	1.7	0.1	0.2	2.7	2.0	133.2	1.6	1.4
HDGV4	0.9	0.1	0.1	0.7	0.0	0.1	1.2	0.8	57.2	0.7	0.5
HDGV5	2.2	0.4	0.4	1.8	0.1	0.2	3.0	2.1	174.3	2.2	1.6
HDGV6	4.4	0.9	0.9	3.7	0.2	0.4	6.3	4.4	359.0	4.6	3.4
HDGV7	1.8	0.4	0.4	1.5	0.1	0.2	2.5	1.8	161.2	2.0	1.4
HDGV8A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HDGV8B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MC	3.0	0.6	1.8	2.1	0.1	0.8	5.4	3.0	178.5	1.4	1.6
LDDV	4.5	0.2	0.3	4.1	0.0	0.1	4.9	4.3	37.5	1.7	0.2
LDDT12	2.8	0.1	0.1	2.6	0.0	0.0	3.0	2.7	24.6	0.6	0.1
LDDT34	5.8	0.4	0.7	5.4	0.1	0.3	6.9	5.8	61.9	6.2	0.4
HDDV2B	38.8	2.2	3.4	35.9	0.6	1.5	44.4	37.9	1,102.6	42.0	7.4
HDDV3	10.5	1.0	1.0	9.8	0.3	0.4	12.6	10.5	373.1	14.2	2.3
HDDV4	11.6	1.1	1.1	10.7	0.3	0.5	13.8	11.5	475.6	17.3	2.4
HDDV5	5.1	0.5	0.5	4.7	0.1	0.2	6.1	5.1	236.9	8.3	1.1
HDDV6	50.5	2.6	2.7	46.7	0.6	1.1	55.7	48.5	1,642.0	48.0	5.7
HDDV7	75.0	3.7	3.9	69.4	0.9	1.6	82.5	72.0	2,958.7	80.2	8.3
HDDV8A	110.1	13.4	4.6	101.9	3.3	2.0	128.2	107.3	4,543.4	110.9	10.0
HDDV8B	410.8	47.3	16.4	380.3	11.8	7.0	474.5	399.1	18,835.8	411.7	35.5
HDGB	0.8	0.1	0.1	0.6	0.0	0.0	1.0	0.6	47.0	0.5	0.3
HDDBT	15.9	0.3	0.3	14.7	0.1	0.1	16.6	14.9	458.9	12.3	0.7
HDDBS	31.1	0.6	0.6	28.7	0.2	0.3	32.4	29.1	608.8	16.1	1.4
<b>Total</b>	<b>990</b>	<b>291</b>	<b>375</b>	<b>913</b>	<b>73</b>	<b>159</b>	<b>1,656</b>	<b>1,145</b>	<b>60,045</b>	<b>1,461</b>	<b>2,731</b>

#### 5.4.2 AP-42 emission factors for paved and unpaved roads

While the exhaust, tire wear, and brake wear emissions were calculated using the EPA MOBILE6.2 model, fugitive dust from paved and unpaved roads were calculated using equations found in AP-42, Fifth Edition. AP-42 is the common name for the EPA Compilation of Air Pollutant Emission Factors. Specifically, sections 13.2.1 and 13.2.2 of AP-42 describe calculations for fugitive dust from paved and unpaved roads, respectively.

The calculations for paved road fugitive dust emissions are related to silt loading values on road surfaces. As described previously, paved roads were split into three silt loading levels; freeways with a silt loading of 0.02 grams per square meter, high traffic arterials, 0.067 grams per square meter, and low traffic arterials, 0.23 grams per square meter. All local roadways were assumed to fall into the low traffic arterial category. These silt loading estimates are consistent with the Serious Area PM<sub>10</sub> Plan. When input to the AP-42 equation, these silt loadings result in the following PM<sub>10</sub> emission factors: freeways 0.15 grams per VMT, high ADT non-freeways at 0.58 grams per VMT, and low ADT non-freeways at 1.54 grams per VMT. The November



2006 revision of AP-42 indicates that PM<sub>2.5</sub> emission rates are 15 percent of the PM<sub>10</sub> emission rates for paved roads.

The VMT in each silt loading category may be found in Table 5.2–2. Combining the paved road fugitive dust emission factors with the VMT estimates in Tables 5.2–2 results in the emission totals for the PM<sub>10</sub> modeling area shown in Table 5.4–6.

**Table 5.4–6. 2005 paved road fugitive dust emissions in the PM<sub>10</sub> modeling area.**

Silt Loading Category	Emissions (kg/day)	
	PM <sub>10</sub>	PM <sub>2.5</sub>
Freeway	4,189	628
High Traffic Arterial	23,295	3,494
Low Traffic Arterial	14,920	2,238
Total	42,404	6,360

Applying the VMT ratios in Table 5.2–4 to the modeling area emissions in Table 5.4–6 produces the total 2005 paved road fugitive dust emissions in the PM<sub>10</sub> nonattainment area and Maricopa County without reductions due to control measures in the Serious Area PM<sub>10</sub> Plan. These results are shown in Table 5.4–7.

**Table 5.4–7. 2005 paved road fugitive dust emissions without Serious Area PM<sub>10</sub> Plan control measures.**

Total emissions (kg/day)	PM <sub>10</sub>	PM <sub>2.5</sub>
Nonattainment area	42,701	6,405
Maricopa County	44,779	6,717

The Serious Area PM<sub>10</sub> Plan contained a number of measures to reduce paved road fugitive dust emissions (MAG, 2000). The estimated emission reductions attributable to these measures in 2005 are summarized below in Table 5.4–8:

**Table 5.4–8. Estimated emission reductions attributed to measures to reduce paved road fugitive dust.**

Paved Road Control Measures	2005 PM <sub>10</sub> Emission Reductions (kg/day)
1. PM <sub>10</sub> Efficient Street Sweepers	6,441
2. Curbing, Paving or Stabilizing Shoulders on Paved Roads	1,412
3. Paving, Vegetating or Chemically Stabilizing Unpaved Access Points onto Paved Roads	590
Total 2005 PM <sub>10</sub> Emission Reductions	8,443

Applying these reductions to the emissions in Table 5.4–7 results in the total paved road emissions shown in Table 5.4–9. The controlled PM<sub>2.5</sub> emissions were assumed to be 15 percent of the controlled PM<sub>10</sub> emissions, based on AP-42 guidance for paved roads.

**Table 5.4–9. 2005 fugitive dust emissions from paved roads.**

Area	PM <sub>10</sub> Emissions			PM <sub>2.5</sub> Emissions		
	kg/day	lbs/day	tons/yr	kg/day	lbs/day	tons/yr
PM <sub>10</sub> NAA	34,258	75,525	13,783	5,139	11,329	2,068
Maricopa County	36,336	80,106	14,619	5,450	12,016	2,193

For unpaved roads, emission factors from AP-42 were applied to the VMT estimates from the Serious Area PM<sub>10</sub> Plan shown in Table 5.2–3. The unpaved road particulate emission factors were derived from the AP-42 equation for publicly accessible unpaved roads, assuming a silt

content of 11.9%, soil moisture content of 0.5%, a mean vehicle weight of three tons, and an average speed of 25 mph. The resultant emission factor for PM<sub>10</sub> is 666.62 grams per vehicle mile of travel. The comparable PM<sub>2.5</sub> emission factor based on AP-42 is 10 percent of the PM<sub>10</sub> factor or 66.66 grams per vehicle mile. The unpaved road mileage estimates in Table 5.2–3 assume that all commitments to pave unpaved roads in the Serious Area PM<sub>10</sub> Plan have been implemented by 2005. Multiplying the unpaved road emission factors by the VMT estimates in Table 5.2–3 results in the emissions for the PM<sub>10</sub> modeling area shown in Table 5.4–10.

**Table 5.4–10. Unpaved road fugitive dust emissions for the PM<sub>10</sub> modeling area.**

Unpaved road type	Emissions (kg/day)	
	PM <sub>10</sub>	PM <sub>2.5</sub>
High traffic	17,943	1,794
Low traffic	3,011	301
Total	20,954	2,095

Applying the VMT ratios in Table 5.2–4 to the PM<sub>10</sub> modeling area emissions in Table 5.4–10 produces the total 2005 unpaved road fugitive dust emissions in the PM<sub>10</sub> nonattainment area and Maricopa County. These results are shown in Table 5.4–11.

**Table 5.4–11. 2005 fugitive dust emissions from unpaved roads.**

Area	PM <sub>10</sub> Emissions			PM <sub>2.5</sub> Emissions		
	kg/day	lbs/day	tons/yr	kg/day	lbs/day	tons/yr
PM <sub>10</sub> NAA	21,101	46,519	8,490	2,110	4,652	849
Maricopa County	22,127	48,781	8,903	2,213	4,879	890

## 5.5 Summary of particulate emissions from onroad mobile sources

Table 5.5–1 summarizes the annual emissions (in English tons per year) and the average daily emissions (in pounds per day) for the pollutants PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>2</sub>, and NH<sub>3</sub> from all onroad mobile sources in the PM<sub>10</sub> nonattainment area in 2005. Similar data for all of Maricopa County is presented in Table 5.5–2.

**Table 5.5–1. Annual and average daily 2005 emissions from all onroad mobile sources for the PM<sub>10</sub> nonattainment area.**

	Annual emissions (tons/yr)					Average daily emissions (lbs/day)				
	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>x</sub>	NH <sub>3</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>x</sub>	NH <sub>3</sub>
Exhaust	1,041	960	63,093	1,536	2,870	5,702	5,258	345,713	8,415	15,725
Paved road fugitive dust	13,783	2,068				75,523	11,329			
Unpaved road fugitive dust	8,490	849				46,519	4,652			
Tire wear	305	76				1,673	418			
Brake wear	394	167				2,158	915			
<b>Total:</b>	<b>24,013</b>	<b>4,120</b>	<b>63,093</b>	<b>1,536</b>	<b>2,870</b>	<b>131,575</b>	<b>22,572</b>	<b>345,713</b>	<b>8,415</b>	<b>15,725</b>

**Table 5.5–2. Annual and average daily 2005 emissions from all onroad mobile sources for Maricopa County.**

	Annual emissions (tons/yr)					Average daily emissions (lbs/day)				
	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>x</sub>	NH <sub>3</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>x</sub>	NH <sub>3</sub>
Exhaust	1,092	1,007	66,187	1,611	3011	5,982	5,516	362,669	8,827	16,496
Paved road fugitive dust	14,619	2,193				80,104	12,015			
Unpaved road fugitive dust	8,903	890				48,781	4,879			
Tire wear	320	80				1,755	439			
Brake wear	413	175				2,264	960			
<b>Total:</b>	<b>25,347</b>	<b>4,345</b>	<b>66,187</b>	<b>1,611</b>	<b>3,011</b>	<b>138,886</b>	<b>23,809</b>	<b>362,669</b>	<b>8,827</b>	<b>16,496</b>

## 5.6 Quality assurance process

### 5.6.1 VMT estimates

Normal quality assurance procedures, including automated and manual consistency checks, were conducted by MAG in developing the 2005 EMME2 traffic assignment used to generate the VMT data. The MAG travel demand model VMT estimates have been validated against more than 3,000 traffic counts collected in 2002–2003, as well as Highway Performance Monitoring System data submitted annually by ADOT to the Federal Highway Administration.

### 5.6.2 Emission factor estimates

The quality assurance process performed on the MOBILE6.2 analyses included accuracy, completeness, and reasonableness checks. For accuracy and completeness, a system was used that included an independent reviewer. All calculations were checked independently for accuracy and completeness by the reviewer. Any errors found were corrected and the changes were then rechecked by the reviewer.

### 5.6.3 Draft particulate matter emissions inventory

The draft onroad mobile source portion of the 2005 periodic particulate matter emissions inventory was reviewed using published EPA quality review guidelines for base year emission inventories (EPA Document 450/4-91-022, September 1991). The procedural review (Levels I, II, and III) included checks for completeness, consistency, and the correct use of appropriate procedures.

As an additional QA check, the average miles per gallon estimate was derived using average annual daily VMT estimates and gasoline sales from ADOT. The results of that QA check may be found in Appendix 5.

## 5.7 References

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